

United States
Circuit Court of Appeals
For the Ninth Circuit.

WARREN BROTHERS COMPANY,

Appellant,

vs.

C. M. THOMPSON, O. M. THOMPSON, E. O.
THOMPSON, Co-partners, doing business under
the firm name and style of THOMPSON
BROTHERS, H. E. VOGEL and J. B. HILL,
Appellees.

Transcript of Record.

Upon Appeal from the United States District Court for
the Southern District of California,
Southern Division.

No.

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[Clerk's Note: When deemed likely to be of an important nature, errors or doubtful matters appearing in the original certified record are printed literally in italic; and, likewise, cancelled matter appearing in the original certified record is printed and cancelled herein accordingly. When possible, an omission from the text is indicated by printing in italic the two words between which the omission seems to occur.]

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Building, Los Angeles, California.

Special Patent Counsel;

RAY C. WAKEFIELD,

Special Counsel for County of Fresno;

O. R. LOVEJOY,

District Attorney of the County of Fresno,

312 Stock Exchange Bldg., Los Angeles, California.

F.-1 Equity.

United States of America, ss.

To C. M. Thompson, O. M. Thompson, E. O. Thompson, co-partners doing business under the firm name of Thompson Brothers, H. B. Vogel, J. B. Hill, and the County of Fresno, a body politic and corporate of the state of California, GREETING:

You are hereby cited and admonished to be and appear at a United States Circuit of Appeals for the Ninth Circuit, to be held at the City of San Francisco, in the State of California, on the 22nd day of December A. D. 1922, pursuant to order allowing an appeal entered in the Clerk's Office of the District Court of the United States, in and for the Southern District of California, Southern Division, in that certain suit in Equity F-1 wherein you are defendants and appellees and Warren Brothers Company, a corporation, complainants and appellants, and you are ordered to show cause, if any there be, why the order and decree of said Court made and entered June 1, 1922, against said appellants in the said order allowing appeal mentioned, should not be corrected, and speedy justice should not be done to the parties in that behalf.

WITNESS, the Honorable Benjamin F. Bledsoe
United States District Judge for the Southern
District of California, this 23rd day of November, A. D. 1922, and of the Independence of the
United States, the one hundred and forty-seventh.

Bledsoe

U. S. District Judge for the Southern District of
California.

Received a copy of the within Citation this 24th day of November, 1922.

Frederick S. Lyon .

Leonard S. Lyon

Ray C. Wakefield

Solicitors and Attorneys for Defendants.

FILED NOV. 27 1922 CHAS. N. WILLIAMS

Clerk By W. J. Tufts E. R. Bk.

UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF
CALIFORNIA SOUTHERN DIVISION

WARREN BROTHERS COMPANY,)
a corporation,)

Plaintiff,)

vs.)

IN EQUITY

C. M. THOMPSON, O. M. THOMP-)
SON, E. O. THOMPSON, copart-)
ners doing business under the firm)
name and style of THOMPSON)
BROS.; H. E. VOGEL and J. B.)
HILL,)

Defendants.)

No. F 1 Eq.

To the Honorable Judges of the United States District
Court for the Southern District of California,
Southern Division:

Warren Brothers Company, a corporation duly organized under the laws of the State of West Virginia, a citizen of the United States and of said State of West Virginia, and having a principal place of business in the City of Boston, State of Massachusetts, brings

this Bill of Complaint against C. M. Thompson, O. M. Thompson, E. O. Thompson, copartners doing business under the firm name and style of Thompson Bros., all citizens of the State of California, and resident and inhabitant of the County of Fresno, State of California; H. E. Vogel and J. B. Hill, both citizens of California, and both resident and inhabitant of the County of Fresno, State of California.

And thereupon your orator complains and says:

-I-

That heretofore and prior to the 28th day of June, 1909, one, Edwin C. Wallace, a citizen of the United States, became and was original, first and sole inventor of a new and useful improvement in street pavements not known or used by others in this country before his invention or discovery thereof, more than two years prior to his application for Letters Patent of the United States, and not in public use or on sale in this country for more than two years prior to his said application for Letters Patent and not abandoned; and that thereupon he made application to the Commissioner of Patents of the United States in due form of Law for Letters Patent of the United States, whereupon such proceedings were had that upon the 31st day of May, 1910, Letters Patent of the United States, No. 959,976, duly signed and sealed, were issued to the said Edwin C. Wallace, whereby there was granted to him, his heirs and assigns, the exclusive right to make, use and vend said invention throughout the United States and the territories thereof for the term

of seventeen years from the date of said Letters Patent, as will more fully appear from said Letters Patent, or a certified copy thereof, a printed Patent Office copy of the specifications, drawings and claims forming a part of said Letters Patent being hereto attached and marked "Exhibit No. 1."

-II-

That thereafter, to wit, on the first day of April, 1912, by an instrument in writing duly recorded in the United States Patent Office, said Edwin C. Wallace assigned to your orator the entire right, title and interest in and to said Letters Patent, as will more fully appear from said assignment, and your orator hereby makes profert of the same, or a certified copy thereof, a typewritten copy of the same being hereto attached and marked "Exhibit No. 2."

-III-

And your orator further shows unto your Honors that it is now the sole owner of said Letters Patent and all rights of action thereunder, and is entitled to all damages occasioned by the infringement of said Letters Patent and is by law entitled to sue for and receive the same to its own use.

-IV-

That said Composite Pavement was a new and useful invention, which was neither known nor used by others in this country before the invention and discovery thereof by the said Wallace, and which was neither patented nor described in any printed publication in this or any foreign country before the inven-

tion and discovery thereof by the said Wallace, or more than two years before his application for United States Letters Patent therefor, and at the time of his application for United States Letters Patent therefor, as hereinafter alleged the same have not been in public use or on sale in the United States for more than two years, and was not patented, or caused to be patented by him, or by his legal representatives or assigns in any foreign country upon an application which was filed more than twelve months prior to the filing of his said application in this country, nor had the same been abandoned by him.

-V-

Your orator further shows that the invention covered by said patent is of great commercial value and practical utility and that the trade and public generally have acquiesced in the validity of said Letters Patent and recognized the rights of your orator under the same, and many cities and contractors are regularly paying royalties for the use thereof, and that if your orator can receive lawful protection against infringers of said Letters Patent the same would be of much value to it and large profits would accrue therefrom to your orator. That since the acquirement by your orator of the aforesaid rights under said Letters Patent, your orator has been extensively engaged throughout the United States in the manufacture and construction of pavements embodying said invention and has expended large sums of money in and about manufacturing pavements under said Letters Patent and

in further introducing said improvement into actual use, and has caused such pavements to be extensively put upon the market and has expended much time, labor and money in respect to said invention in introducing the same to the public and has created a great demand and large market therefor, which your orator has the exclusive right to supply under said Letters Patent, and that it has prepared to supply the said market therefor throughout the United States. That it has a large number of employees engaged in the construction of said pavements, and that it still retains for itself and its licensees the exclusive right to make, construct, use and sell said pavements embodying the said invention. That said invention has proved of great value and that your orator will realize great gains and profits from the exclusive enjoyment of said rights if the infringement by these defendants hereinafter more particularly referred to shall be prevented.

-VI-

That the County of Fresno, a corporation, is a body corporate and politic created under the laws of the State of California.

-VII-

Your orator avers that the County of Fresno, in California, by motion duly approved, adopted specifications No. 1 and 2, as presented by the County Surveyor for "Part of Route 5, Section A", Fresno County Highway System, on the 27th day of September, 1920. That in and by said specifications, and particularly by Specifications No. 1 thereof, the said County

of Fresno adopted specifications governing the laying of so-called "(Section VI) Asphalt Wearing Surface, type A" for said part of Route 5, Section A, Fresno County Highway System, which said specifications contained the inventions covered and secured by said U. S. Letters Patent No. 959,976.

And your orator shows that the specifications No. 1, of said Fresno County specified and provided for wearing surface, "Section VII, Asphalt Wearing Surface, type B", which said specifications are specifications providing for the construction of work done in the past in the said County of Fresno, in the State of California, under said Letters Patent, No. 959,976. And your orator prays that said specifications No. 1 may be deemed and taken as a part of this bill, and to the original, or to a duly authenticated copy thereof, now in your orator's possession, and in the Court to be produced, your orator prays leave to refer. That a copy of said specifications No. 1 is set out in "Exhibit 5", hereto attached, being a portion of the contract and specifications for the improvement of that portion of Fresno County Highway System indicated as part of Route 5, Section A.

-VIII-

And your orator avers that prior to the entering into of the said contract hereinafter referred to by the defendants herein, your orator did file with the said County of Fresno, to wit, the Board of Supervisors thereof, a Warrenite-Bitulithic License Mixture Agreement of date of October 1, 1920, wherein and

whereby your orator did offer to furnish and deliver to the said County of Fresno and to any bidder to whom a contract might be awarded and who would enter into a contract with the said County of Fresno to pave the roads in said agreement stated, to wit, Route 5, Section A, with Warrenite-Bitulithic Pavement upon the terms in said License Mixture Agreement stated. And your orator hereby makes profert of said Warrenite-Bitulithic License Mixture Agreement of October 1, 1920, or a certified copy thereof, a copy thereof being hereto attached marked "Exhibit No. 3."

-IX-

And your orator avers that the said Board of Supervisors of said Fresno County, by motion duly made and carried, on the 30th day of September, 1920, caused notice to contractors to be published inviting sealed proposals for the construction of work on said part of Route 5, Section A, Fresno County Highway System. That said notice, among other things, provided as follows: "Reference is hereby made to that certain license mixture agreement for the sale of Warrenite-Bitulithic paving mixture on file in the office of the Board of Supervisors." And your orator hereby makes profert of said notice to contractors of date of September 30, 1920, or a certified copy thereof, a copy thereof being hereto attached, marked "Exhibit No. 4."

And your orator avers that the defendant, Thompson Bros., submitted a proposal for the improvement of that portion of Fresno County Highway System, in-

licated as part of Route 5, Section A, and was awarded by the County of Fresno a contract for the performance of said work.

And your orator further shows unto your Honors that since the issuing of said Letters Patent, and before the commencement of this suit, the County of Fresno and the defendants, Thompson Bros., well knowing the premises, and the rights and privileges secured to your orator by said Letters Patent, but contriving and conspiring to injure your orator and deprive it of the profits, benefits and advantages which might otherwise accrue to it, have entered into a contract of date of November 5, 1920, for laying and using, and causing the making, constructing, laying and using of large areas and extents of pavement and roadways containing the invention set forth in said Letters Patent, to wit: That portion of Fresno County Highway System designated as part of Route 5, Section A, in key map on file in the office of the Board of Supervisors of said County, and in the office of the County Surveyor, 306 Cory Building, Fresno, California, said roadway being that portion of Blackstone Avenue, in the County of Fresno, State of California, adjoining the city boundary of the City of Fresno, and running northerly therefrom for a distance of approximately six hundred (600) feet from the city boundary, and in violation of the exclusive privileges secured thereby to your orator and in infringement of said Letters Patent No. 959,976. That said contract was duly executed by said County of

Fresno, by Chris Jorgensen, Chairman, Board of Supervisors, attested by D. M. Barnwell, County Clerk and Ex-Officio Clerk of the Board of Supervisors. By J. R. Schaefer, deputy, and by the defendants, Thompson Brothers, C. M. Thompson, O. M. Thompson, E. O. Thompson, Contractor, and duly filed with the said County of Fresno, where it still remains of record.

That in accordance with the terms and requirements to contractors inviting sealed proposals for improving county highway, part of Route 5, Section A, and in accordance with the terms and requirements of said contract and the laws of the State of California, the said defendants, Thompson Bros., By O. M. Thompson, E. O. Thompson and C. M. Thompson, executed their BOND FOR THE FAITHFUL PERFORMANCE OF CONTRACT, with the defendants H. E. Vogel and J. B. Hill as sureties thereon, in the penal sum of \$900.00; and further, the said defendants, Thompson Brothers, By O. M. Thompson, E. O. Thompson and C. M. Thompson, executed their BOND FOR THE SECURITY OF MATERIALMEN, LABORERS AND OTHERS to the County of Fresno, with the defendants H. E. Vogel and J. B. Hill as sureties thereon in the penal sum of \$1800.00.

And your orator hereby makes profert of said proposal, contract, specifications, Bond for the Faithful Performance of Contract, and Bond for the Security of Materialmen, Laborers and Others, or a certified

copy thereof, a copy thereof being hereto attached, marked "Exhibit No. 5."

-X-

And your orator further avers that under and by the terms of said contract and bonds, the said defendants have contracted and agreed and undertaken to, and have made, used and sold the same pavement and structures that are the inventions described in and claimed by your orator under its said U. S. Letters Patent No. 959,976, embodying and using in said pavement and structure the several inventions covered by said patents claimed by your orator, and within six years prior to the commencement of this suit, and have entered upon said part of Route 5, Section A, Fresno County Highway System, and have laid down the said pavement thereon.

-XI-

And your orator further shows unto your Honors that it has caused due notice to be given to the defendants of the infringement of the letters patent of your orator, and your orator is informed and believes that notwithstanding the said knowledge the defendants have made and committed the acts of infringement complained of against the whole and without the license of your orator upon said part of Route 5, Section A, Fresno County Highway System, and that the said County of Fresno is planning and threatening to commit other similar acts of infringement, greatly to your orator's damage, whereby your orator will be deprived of much gain and profit and will thereby

suffer irreparable damage to its business in that said infringement will induce other parties to infringe and thereby greatly injure your orator's business and cause it great damage and expense.

-XII-

Your orator further shows unto your Honors that it has in the past made, manufactured and constructed for and to the use of said County of Fresno, large areas of said pavement in accordance with the improvement set forth in its said Letters Patent, and that it has been and is willing and able to make, manufacture and construct for and to the use of said County of Fresno, and defendants, C. M. Thompson, O. M. Thompson, E. O. Thompson, copartners doing business under the firm name and style of Thompson Bros., H. E. Vogel and J. B. Hill, all such pavements and roadways as may be required by said defendants in accordance with the improvements set forth in said Letters Patent. Your orator further shows that at great cost and expense during the period of ten years last past has provided and built up an organization of men educated and skilled in the manufacturing of pavements of the kind and character specified to be laid in said contract and said Letters Patent, No. 959,976, and has at further great expense established laboratory and inspection service to insure the proper laying of said pavements, and that the unlawful infringement by said defendants will diminish the business of your orator, and will tend to deprive it of profits and advantages to which it is

entitled and to incite and encourage others to infringe upon your orator's rights.

-XIII-

And your orator avers that it has for many years last past been engaged in the business of manufacturing and under its supervision and control of licensing the manufacturing and laying of pavements embodying the claims stated in said Letters Patent, No. 959,976, and that it has built up a large and profitable business in that behalf, and that the laying of said pavement provided for in said contract of November 5, 1920, provided to be laid, will result in great and irreparable injury and damage to your orator in that pavements heretofore exclusively manufactured by your orator, or under the supervision and direction of your orator, will be attempted to be laid by the defendants herein, and under the false claim and pretense that said pavements are pavements manufactured by your orator, or under the supervision and direction of your orator, or laid under and in accordance with the claims stated in said Letters Patent No. 959,976, to the great injury and damage to your orator.

-XIV-

And your orator avers that other proceedings are pending before the municipal officers of the County of Fresno for the improvement of streets under said specifications hereinabove described, as "Specifications, Section VI, Asphalt Wearing Surface, Type A", embodying and necessitating the use of inventions claimed by your orator under said Letters Patent No. 959,976.

That your orator on account of its being the owner of said patent No. 959,976, having the exclusive right to make, use and sell the said inventions in said County of Fresno, and the State of California, and because of its investment and expenditures in introducing the use of said pavement, is able and ready to undertake all such work. That because of said wrongful claims and threats and actions of said defendants, the rights of bidders to enter into such contracts and to perform the same are hindered and interfered with, and your orator will lose the opportunity of getting such work so proposed, whereby your orator suffers great, special and irreparable damage and injury. That because of said wrongful claims, threats and actions of said defendants to do said work without first obtaining from your orator a license or permit to use said patent upon the terms stated in the offer made to the County of Fresno, or to any contractor who may obtain a contract from said County to do said work your orator will suffer great, special and irreparable damage and injury.

-XV-

And your orator further avers that the infringement above complained of by the defendants is a great and continuing injury to it. That said infringement is interfering with the business of making, selling, and using and licensing others to make, use and sell pavements and artificial structures described and claimed in said Letters Patent No. 959,976, and your orator further avers that unless the defendants are restrained

by writ of injunction issuing out of this Court, the said defendants will continue to infringe said patents and will induce and lead others to infringe said patents and thereby will cause irreparable injury to your orator's aforesaid rights.

YOUR ORATOR, THEREFORE, PRAYS YOUR HONORS to grant unto your orator a decree holding that the legal and equitable title to said patent No. 959,976 is vested in your orator; that said patent and the claims thereof are valid and infringed by the defendants; a preliminary and also a permanent writ of injunction issuing out of and under the seal of this Honorable Court, directed to C. M. Thompson, O. M. Thompson, E. C. Thompson, co-partners doing business under the firm name and style of Thompson Bros., and the said H. E. Vogel and J. B. Hill, and strictly enjoining them, and each of them, their agents and employees, not to make, use or sell, or cause to be made, used or sold, any pavement or artificial structure which will contain or employ the inventions covered and secured by the claims of said Letters Patent No. 959,976, or any of them, and especially enjoining the defendants, and each of them, and their agents and employees, not to make, use or sell, or cause to be made, used or sold upon said part of Route 5, Section A, in the County of Fresno, any pavement or artificial structure which will contain or employ the said inventions or any part thereof.

AND YOUR ORATOR FURTHER PRAYS that the defendants, and each of them, by a decree of this

Court, may be compelled to account to and pay to your orator, all the profits which they may have derived from any making, using or selling of any pavements or artificial structures covered and secured by said Letters Patent, No. 959,976, and that also the defendants, and each of them, be decreed to pay all damages which your orator has incurred or shall incur upon account of the said defendants' infringement of the said Letters Patent, No. 959,976, with such increase thereof as shall seem meet.

YOUR ORATOR FURTHER PRAYS that the defendants be decreed to pay the cost of this suit and that your orator may have such other and further relief as the equity of the cause or the statutes of the United States require and to this Court may seem just.

TO THE END THEREFORE that the defendants may, if they can, show why your orator should not have the relief prayed, it is prayed that the defendants, according to the best and utmost of their knowledge, remembrance, information and belief, make full, true, direct and perfect answer to the matters hereinbefore stated and charged, but not under oath, answer under oath being hereby expressly waived; and to the end, therefore, that your orator may have such recovery and relief, may it please your Honors to grant unto your orator, not only a writ or writs of injunction conformable to the prayer of this bill, but also a writ of subpoena ad respondendum issuing out of and under the seal of this Honorable Court and directed to the said defendants C. M. Thompson, O. M.

Thompson, E. O. Thompson, co-partners doing business under the firm name and style of Thompson Bros., and to the defendants H. E. Vogel and J. B. Hill, sureties, and commanding them, and each of them, to appear before this Court then and there to answer this bill and to abide by such decree herein as to this Court shall seem just.

WARREN BROTHERS COMPANY,

By John Dearborn

Prest.

J. M. Head,
9 Cambridge St.,
Boston, Mass.

and

Paul S. Honberger,
629 Citizens National Bank Bldg.,
Los Angeles, California.
Solicitors for Complainant.

Boston. Feb. 4, 1921

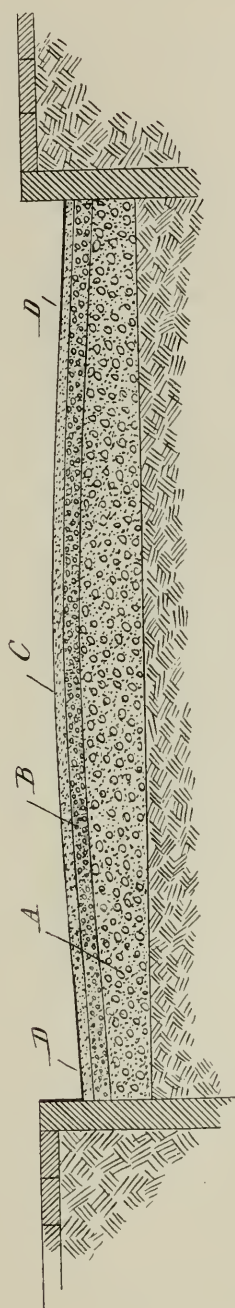
COMMONWEALTH OF MASSACHUSETTS,
COUNTY OF SUFFOLK, ss.

Personally appeared John Dearborn and made oath that he is President of Warren Brothers Company, Complainant in the foregoing bill; that he has read the above bill by him subscribed on behalf of said company; that he has authority to affix the name of said company thereto, and that the contents of said bill are true, excepting the matters therein stated on

E. J. DE SMEDT.
ARTIFICIAL PAVEMENT.

No. 375,273.

Patented Dec. 20, 1887.



Witnesses

Edwin T. Jewell
Chas. F. John.

Inventor

Edward J. De Smedt.

By his Attorney

I. W. Sinsabaugh.

UNITED STATES PATENT OFFICE.

EDWIN C. WALLACE, OF EAST AUBURN, CALIFORNIA.

COMPOSITE PAVEMENT.

959,976.

Specification of Letters Patent.

Patented May 31, 1910.

Application filed June 28, 1909. Serial No. 504,858.

To all whom it may concern:

Be it known that I, EDWIN C. WALLACE, citizen of the United States, residing at East Auburn, in the county of Placer and State of California, have invented certain new and useful Improvements in Composite Pavements, of which the following is a specification.

My present invention has relation to composite pavements; and it contemplates the provision of such a pavement, adapted to be expeditiously laid at small cost of skilled-direction, apparatus, labor and material, and one having a surface-coating or upper course that is rendered impermeable to the elements without the use of so much comminuted or other fine material that the surface-coating mixture is "mushy" in character, and also having a lower course possessed of rigidity, so that the pavement as a whole is well calculated to withstand the conditions and the usage to which composite pavements are ordinarily subjected.

In the drawing, accompanying and here-by made a part hereof: the figure is a vertical sectional view of a portion of a composite pavement produced in accordance with my invention.

The invention alluded to consists in a process of producing a pavement and in the pavement, the product of the process, and for the sake of convenience and brevity I will describe in detail the fabrication of the pavement from which description considered conjunctively with the lettered drawing both the process and the pavement produced by the practice of the process will be fully understood.

By reference to the drawing it will be seen that A is a prepared foundation which I would emphasize may be of any character consonant with the purpose of my invention. B is the lower course of the novel and advantageous pavement, and C, the upper course or surface-coating thereof.

In laying a pavement in accordance with my invention I make use of stone of a size to pass through the interstices of a screen giving a stone, the largest of which, is the maximum size desired, and this stone together with smaller pieces of stone and comminuted stone or dust, in the state that the whole run is discharged from a crusher, I mix with sufficient bituminous or binder con-

B, disposed on the foundation A, as illustrated. I also make use of a fine bituminous mixture—i. e., a mixture produced by commingling either sand or crusher-screenings (comminuted-stone) or both with sufficient bituminous or asphalt cement to form a homogeneous mass. This bituminous mixture I spread in a thin coat or layer over the course B laid as before described but not compressed or subjected to pressure or tamping, and in that way produce the upper course or surface coating C. I then subject the laid material—i. e., the material comprising courses B and C, to initial pressure or compression, preferably by moving a heavy roller over the same, and by so doing not only compress the two courses to the extent necessary but tie or bind the upper or surface-coating course C to the lower or stone-mixture course B, and provide a dense surface layer or course without in any way proportioning the amount of fine material used in connection with the coarser stone.

Attention is here invited to the fact that while I describe the pavement made in accordance with my invention as having two courses B and C, the completed pavement is not a multi-layer pavement, but on the other hand the two courses are practically pressed, by the single compression referred to, into a single mass. This is materially advantageous inasmuch as it assures the production of a pavement, the lower portion of which is possessed of the required rigidity, and the upper portion or surface of which is dense and impermeable and is adapted to close or seal to advantage and without tendency of separating, and this without the employment of a large amount of fine material which is objectionable because of its liability to render the mixture mushy. I would also direct attention to the fact that while my improvements assure a rigid lower portion and a top surface sealed to the elements, which are the essential properties of a good wearing pavement, the pavement is adapted to be quickly and cheaply made; the material of the first course B being spread upon the previously prepared foundation to the required depth, and the upper course or surface-coating C being raked in a thin layer over the material B and brought to a true surface before the application of the

same had this assignment and sale not been made.

30 The invention alluded to consists in a process of producing a pavement and in the pavement, the product of the process, and for the sake of convenience and brevity I will describe in detail the fabrication of the pavement from which the lettered drawing considered 35 conjunctively with the lettered drawing both the process and the pavement produced by the practice of the process will be fully understood.

40 By reference to the drawing it will be seen that A is a prepared foundation which I would emphasize may be of any character consonant with the purpose of my invention. B is the lower course of the novel and advantageous pavement, and C, the upper 45 course or surface-coating thereof.

In laying a pavement in accordance with my invention I make use of stone of a size to pass through the interstices of a screen giving a stone, the largest of which, is the 50 maximum size desired, and this stone together with smaller pieces of stone and comminuted stone or dust, in the state that the whole run is discharged from a crusher, I mix with sufficient bitumen, of proper consistency, to form a homogeneous mass, and in that way produce the first or lower course 55

Having described my invention, what I claim is disclaimed.
Having described my invention, what I claim is disclaimed.
Having described my invention, what I claim is disclaimed.

other hand the two courses are practically 85 pressed, by the single compression referred to, into a single mass. This is materially advantageous inasmuch as it assures the production of a pavement, the lower portion of which is possessed of the required rigidity, 90 and the upper portion or surface of which is dense and impermeable and is adapted to close or seal to advantage and without tendency of separating, and this without the employment of a large amount of fine material 95 which is objectionable because of its liability to render the mixture mushy. I would also direct attention to the fact that while my improvements assure a rigid lower portion and a top surface sealed to the elements, 100 which are the essential properties of a good wearing pavement, the pavement is adapted to be quickly and cheaply made; the material of the first course B being spread upon the previously prepared foundation to 105 the required depth, and the upper course or surface-coating C being raked in a thin layer over the material B and brought to a true surface before the application of the only pressure to which the composite pavement is subjected. In this connection it will 110 be appreciated that the single compression

of the whole mass simplifies and cheapens the production of the pavement, and instead of preventing or interfering with the ad-herence of the ad-

information and belief, and as to those matters he believes them to be true.

Robert Fowler

(SEAL)

Notary Public

Commission expires March 7, 1924

Robert Fowler, Notary Public

“Exhibit No 2”

ASSIGNMENT

In consideration of one dollar and other good and valuable considerations to me in hand paid by Warren Brothers Company, of Charleston, West Virginia, a corporation duly organized under the laws of the State of West Virginia, and having a usual place of business in Boston, Massachusetts, the receipt whereof is hereby acknowledged, I have assigned, sold, set over and conveyed and by these presents do assign, set over and convey unto the said Warren Brothers Company all the right, title and interest in and to Letters Patent of the United States, No. 959,976, dated May 31, 1910, granted to me for an Improvement in Composite Pavements, and the invention therein described, the same together with all reissues and extensions thereof to be held and enjoyed by the said Warren Brothers Company, its successors and assigns, to the full end of the term of said Letters Patent and for the term or terms of any and all reissues and extensions thereof as fully and entirely as I would have held and enjoyed the same had this assignment and sale not been made.

IN WITNESS WHEREOF I have hereunto set my hand and seal this 1st day of April, 1912.

(Signed) E. C. Wallace (Seal)

In the presence of

(Signed) Ralph L. Warren

(Signed) Charles S. Graham

COMMONWEALTH OF MASSACHUSETTS)
COUNTY OF SUFFOLK, ss.)

Personally appeared Edwin C. Wallace and acknowledged the above instrument to be his free act and deed before me, this 1st day of April, 1912.

(Signed) Charles H. Pindell

Notary Public. (SEAL)

“EXHIBIT No. 3”

WARREN BROTHERS COMPANY
WARRENITE-BITULITHIC LICENSE MIXTURE
AGREEMENT FOR CALIFORNIA

Boston, Mass., October 1, 1920.

TO THE HONORABLE BOARD OF SUPERVISORS OF THE COUNTY OF FRESNO, FRESNO COUNTY, CALIFORNIA.

GENTLEMEN:—

Whereas, it is deemed advisable by the Board of Supervisors of the County of Fresno, State of California, that portions of the Fresno County Highway System respectively indicated as follows, to wit:

Route 5,—Section “A”

as specified in the proceedings relative thereto of the said County of Fresno, be paved with the WARREN-ITE-BITULITHIC pavement, under and in accordance with WARRENITE-BITULITHIC pavement specifications adopted September 27, 1920, of the said County of Fresno, copy of which is attached hereto and is hereby made a part hereof, and

Whereas, the said improvement requires the use of certain patents, and

Whereas, competitive bidding in the letting of contracts is deemed advisable, in order to provide for such competitive bidding, and to secure the adoption of WARRENITE-BITULITHIC as the kind of pavement to be constructed on said roadways; and

Whereas, the undersigned WARREN BROTHERS COMPANY is the owner of all such patents;

Therefore, for the consideration hereinafter named, and in and for the consideration of the adoption by the County of Fresno of such proceedings as may be necessary to provide for the improvement of the above named roadways in accordance with the above named specifications and as specified in the proceedings relative thereto of said County of Fresno;

WARREN BROTHERS COMPANY hereby proposes and agrees to furnish to the County of Fresno and to any bidder to whom a contract or contracts may be awarded to improve any of the above sections specified and who shall enter into a contract or contracts with said County of Fresno to pave said road-

ways or any section or part thereof with the WARRENITE-BITULITHIC pavement, at any time within four (4) months from this date, or at any time thereafter until this offer is withdrawn, the following material ready for use, as specified and required under and by said specifications, and service, with the right to use any or all of the patents, trade marks, or trade names now owned or which may hereafter be owned by WARREN BROTHERS COMPANY, necessary to lay said pavement.

1. The necessary mixture for the wearing surface prepared under the patents of WARREN BROTHERS COMPANY, and *is* accordance with the said specifications of the County of Fresno, delivered hot in wagons of the contractor at the WARRENITE-BITULITHIC mixing plant located *with* an average haul of ten (10) miles to the work to be performed.

2. An expert, who will give advice as to the building of such pavement, will be furnished to the County or Contractor at the expense of Warren Brothers Company.

3. Daily examinations of the mixture as delivered on the roads will be made at the Laboratory of Warren Brothers Company; said samples to be sent, prepaid, to the Laboratory of Warren Brothers Company, Potter Street, East Cambridge, Mass., or #289 East Salmon Street, Portland, Ore., by the County or the Contractor.

The price at which said material and service are offered to said County of Fresno and to all contractors

who make a bid on WARRENITE-BITULITHIC pavement to improve any of the above specified sections of said roadway, and who may enter into a contract or contracts to pave said roadways with said WARRENITE-BITULITHIC pavement is Nine Dollars and Seventy-five Cents (\$9.75) per ton of surface mixture furnished, as provided by the specifications for the construction of said work.

It is understood that if on account of war conditions or by reason of strikes, fire, flood, the common enemy or for any other cause beyond the control of Warren Brothers Company, it is unable after the exercise of reasonable diligence, to secure the shipment of materials or procure the necessary labor for doing the work, that a length of time will be granted to Warren Brothers Company in which to comply with this offer, corresponding to the length of time during which it was unable, for any of the above causes, to proceed with its undertaking.

The execution of any contract or contracts for the said work on the said roadways or any section thereof, by the successful bidder and the said Board of Supervisors shall be deemed by WARREN BROTHERS COMPANY to be an acceptance of the proposal by the said County and by the Contractor and shall bind the undersigned WARREN BROTHERS COMPANY to this agreement as to any such contract or contracts entered into.

The word "Contractor" as used herein shall be deemed to include not only such successful bidder with

whom such a contract may be made and entered into, but also any person, firm or corporation, who may succeed to or do work under any such contract or contracts entered for any said work.

Respectfully submitted,

WARREN BROTHERS COMPANY

By Bernard Benfield

Managing Agent in California.

“Exhibit No 4”

NOTICE TO CONTRACTORS.

Sealed proposals, addressed to the board of supervisors of the county of Fresno, state of California, and endorsed “Proposals for Improving a Part of County Highway Route 5, Section A,” will be received by the said board at its office, in the court house, until 2 o’clock p. m., on the 22nd day of *Octoer*, 1920, and at that time and place will be publicly opened and read.

Said sealed proposals may be upon any one or both of the specifications indicated as “Specifications No. 1” and “Specifications No. 2,” adopted September 27th, 1920, by the said board of supervisors for the construction of said Route and section and according to the plan and profile adopted September 27th, 1920, by said board.

All proposals by each bidder must be made upon blank forms to be obtained from the clerk of the board of supervisors, or at the office of the county surveyor in the Cory building, Fresno; said proposals must give

the prices proposed, both in writing and figures, and must be signed by the bidder, with his address, and must be enclosed under one seal.

Each bid or set of bids is to be presented under sealed cover and shall be accompanied by a certified check made payable to the county of Fresno, for an amount equal to, or in excess of ten per cent of the amount of the greatest of said bids, and no bid shall be considered unless such check is enclosed therewith. Should the successful bidder to whom the contract is awarded fail to execute the same, such check shall be forfeited to the county of Fresno, and the same shall be the property of said county. All other certified checks will be returned to the unsuccessful bidders who submitted the same.

A common-law bond will be required for the faithful performance of the contract in such sum as shall be fixed by the board of supervisors of the county, after the bids are opened; said sum shall not be less than one-fourth of the estimated total amount of the contract; and a further bond in a sum equal to one-half of the estimated total amount of the contract must be furnished as required by the terms of an act entitled, "An act to secure the payment of the claims of persons employed by contractors upon public works, and the claims of persons who furnish materials, supplies, teams, implements or machinery used or consumed by such contractors in the performance of such works, and prescribing the duties of certain public officers with respect thereto." Approved May 10, 1919.

The contractor to whom the contract may be awarded will be required to appear at the office of the board of supervisors, with the sureties or surety offered by him, and execute the contract, within ten days (not including Sunday) from the date of his notification of such award. In case of failure or neglect so to do, he will be considered as having abandoned it, and said forfeiture of said check will operate.

Bidders must satisfy themselves as to the accuracy of the plans, profiles, cross sections, estimates, and all other matters which may influence the prices set forth in their proposals.

The work to be done under these specifications shall be completed on or before March 1, 1921. Reference is hereby made to that certain license agreement for the sale of Warrenite-Bitulithic Paving Mixture, on file in the office of the board of supervisors.

All bids are to be compared on the basis of the county surveyor's estimate of the quantities of work to be done, as follows:

"SPECIFICATIONS NO. 1."

Item 1. 220 cubic yards of earthwork without classification.

Item 2. ——— cubic yards of Portland cement concrete base.

Item 3. ———-square feet of asphalt wearing surface, Type A.

Item 4. ——— square feet of asphalt wearing surface, Type B.

Item 5. 11,754 square feet of asphalt concrete pavement.

Item 6. ——— square feet of bituminous macadam.

Item 7. Total of ——— culverts.

Item 8. Total of ——— linear feet of railing.

“SPECIFICATIONS NO. 2.”

Item 1. 220 cubic yards of earthwork without classification.

Item 2. ——— cubic yards of Portland cement concrete base.

Item 3. ——— square feet of asphalt wearing surface, Type A.

Item 4. ——— square feet of asphalt wearing surface, Type B.

Item 5. 11,754 square feet of asphalt concrete pavement.

Item 6. ——— square feet of bituminous macadam.

Item 7. Total of ——— culverts.

Item 8. Total of ——— linear feet of railing.

The foregoing quantities are *approximate* only, being given as a basis for the comparison of bids, and the county surveyor does not expressly or by implication agree that the actual amount of work will correspond therewith, but reserves the right to increase or decrease the amount of any class or portion of the work, as may be deemed necessary or expedient by the said board.

Plans, profiles and cross-sections may be examined and blank forms of specifications and contracts may

be obtained at the office of the county surveyor, Cory building, Fresno.

Should copies of any maps, plans, profiles, or cross-sections be desired, they will be furnished at the actual cost of blueprinting.

The right is reserved to reject any and all proposals, or to accept the proposals deemed best for the county of Fresno.

It is understood that the contract will be awarded as a whole.

BOARD OF SUPERVISORS OF THE COUNTY
OF FRESNO, STATE OF CALIFORNIA,

By Chris Jorgensen, Chairman.

(Seal)

Attest: D. M. BARNWELL.

County Clerk and ex-Officio Clerk of the Board of
Supervisors B. J. R. Schaffer, Deputy. Fresno,
California, September 27th, 1920.

“Exhibit No 5”

SPECIFICATION No 1
COUNTY OF FRESNO
STATE OF CALIFORNIA
BLANK FORMS,
CONTRACT
AND
SPECIFICATIONS
FOR THE IMPROVEMENT OF THAT PORTION
OF THE
FRESNO COUNTY HIGHWAY SYSTEM
INDICATED AS

Part of ROUTE 5, SECTION A

ADOPTED BY THE BOARD OF SUPERVISORS

.....19....

D. M. BARNWELL,

County Clerk and ex-Officio Clerk of the Board of
Supervisors.

By.....Deputy

Contract No.....

PROPOSAL

FOR THE IMPROVEMENT of that portion of the
Fresno County Highway system indicated as Part of
Route 5, Section A.

BOND ISSUE OF 1919

COUNTY OF FRESNO

To the Honorable Board of Supervisors,

Of the County of Fresno:

The undersigned, as bidder, declares that the only
persons or parties interested in this proposal as princi-
pals, are those named herein; that this proposal is made
without collusion with any other person, firm or cor-
poration; that he has carefully examined the location
of the proposed work, the annexed proposed form of
contract and the plans therein referred to; that he
proposes and agrees, if this proposal is accepted, that
he will contract with the Board of Supervisors of
Fresno County, in the form of the contract annexed
hereto, together with bonds in the form annexed hereto,
to provide all necessary machinery, tools, apparatus,
and other means of construction, and to do all the
work and furnish all materials specified in the con-

tract, in the manner prescribed, and according to the requirements of the County Surveyor as therein set forth; that he will complete the contract on or before March 1, 1921 and that he will take in full payment therefor, the following sums, to-wit:

ITEM 1. For grading roadway, including all necessary grubbing, clearing, cutting, filling and shaping of every description, and all work incidental thereto, the sum of Two and no/100 Dollars (\$2.00), per cubic yard of earthwork.

ITEM 2. For all Portland cement concrete base in place, including the preparation of subgrade, and all work incidental thereto, the sum of.....Dollars, (\$.....) per cubic yard.

ITEM 3. For all asphalt wearing surface, Type A, in place, including all work incidental thereto (no royalties or other charges for patented materials or processes being included), the sum of.....Dollars, (\$.....) per square foot.

ITEM 4. For all asphalt wearing surface, Type B, including all work incidental thereto (no royalties or other charges for patented materials or processes being included), the sum of.....Dollars, (\$.....) per square foot.

ITEM 5. For all asphalt concrete pavement, including the preparation of subgrade, and all work incidental thereto (no royalties or other charges for patented materials or processes being included), the sum of Twenty five and 9/10 cents Dollars, (\$.259) per square foot.

ITEM 6. For all bituminous macadam, including

the preparation of subgrade, and all work incidental thereto, the sum of.....Dollars, (\$.....) per square foot.

ITEM 7. For a total of.....culverts, as indicated on plans, all in place, including all work incidental thereto, a total sum of.....Dollars, (\$.....)

ITEM 8. For a total of.....linear feet of rail-
ing, as indicated on plans, including all work incidental thereto, a total sum of.....Dollars (\$.....).

Accompanying this proposal is a certified check in the sum of \$400.00, being equal to, or in excess of ten per cent of the total amount of said proposal.

If this proposal shall be accepted and the under-
signed shall fail to contract as aforesaid and to give the two bonds, as described in the "Notice to Contractors," and in the blank forms of contract and bonds annexed hereto, with surety or sureties satisfactory to the Board of Supervisors, within ten days (not including Sunday) from the date of the mailing of a notice from the Board of Supervisors to him, according to the address herewith given, that the contract is ready for signature, the said Board may, at its option, determine that the bidder has abandoned the contract, and thereupon this proposal and acceptance thereof shall be null and void, and the forfeiture of such security accompanying this proposal shall operate as and the same shall be the property of the County of Fresno.

Thompson Bros

Signature of bidder

By C. M. Thompson

Business address 2150 G St. Fresno

Place of residence Fresno, Cal

Date 10/22/20, 19...

The full names and residences of all the persons and parties interested in the foregoing proposal as principals are as follows:

(Notice—Give first and last names in full; in case of corporations give names of president, treasurer and manager, and in case of partnership give the names of the individual copartners.)

Claude M. Thompson

Eugene O. Thompson

O. M. Thompson

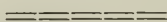
The proposed personal on the bonds to be given is as follows:

Name J. B. Hill

Address of home office H. E. Vogel

California address.....

CONTRACT AND SPECIFICATIONS



THIS AGREEMENT, made and concluded in triplicate, this 5th day of November 1920, between the County of Fresno, a body politic and corporate of the State of California, the party of the first part, hereinafter called the County, and O. M. Thompson, C. M. Thompson, and E. O. Thompson the party of the second part, hereinafter called the Contractor.

WITNESSETH:

ARTICLE I.

That for and in consideration of the payments and agreements hereinafter stipulated, to be made and performed by the said County, and under the conditions

expressed in the two bonds, bearing even date with these presents, and hereunder annexed, the said Contractor agrees with the said County, to do, at his own cost and expense, all the work, and furnish all materials, necessary to construct and complete in a good workmanlike and substantial manner, and to the satisfaction of said County, that portion of the Fresno County Highway System designated as Part of Route 5 (.....), Section A, on the Key Map on file in the office of the Board of Supervisors of said County, and in the office of the County Surveyor, 306 Cory Building, Fresno, California; and in accordance with the following

SPECIFICATIONS:

SECTION 1.—Plans:

The detailed location of the work to be done, together with grades, cross-sections and special construction, is illustrated on the maps, profiles, cross-sections and plans adopted therefor by the Board of Supervisors, and on file in the office of said Board and in the office of the County Surveyor. These maps, plans, profiles and cross-sections are to be considered a part of these specifications, and any notations appearing thereon shall be considered as though incorporated as a part of these specifications.

SECTION II. Work to Be Done:

It is the intention, under these specifications, that the Contractor shall furnish all the necessary labor, tools, implements, machinery and other equipment, and all necessary materials required, for the construction and completion of the work herein referred to, and

as may be more particularly set forth hereinafter. Said work shall be done in a proper, thorough, and approved workmanlike manner.

The finished quantities of work to be done are estimated to be as follows, subject, however, to the right hereby reserved by the Board of Supervisors to increase or diminish the amount of work under any classification, as the necessities of construction may determine:

ITEM 1. 220.0 cubic yards of earthwork without classification. 2.00

ITEM 2.cubic yards of Portland cement concrete base.

ITEM 3.square feet of asphalt wearing surface, Type A.

ITEM 4.square feet of asphalt wearing surface, Type B.

ITEM 5. 11,754.10 square feet of asphalt concrete pavement. .259

ITEM 6.square feet of bituminous macadam.

ITEM 7. Total ofculverts.

ITEM 8. Total oflinear feet of railing.

* * * * *

(f) Payment: Cost of expansion joints, when called for, will be included in the contract price for concrete base.

SECTION VI. ASPHALT WEARING SURFACE, TYPE A.

(Applying to Item 3 of the Proposal)

Item 1. Cleaning Surface: The foundation shall be cleaned of all dirt, or other foreign matter, to the satisfaction of the County Surveyor.

Item 2. Binder Course: The binder course, after thorough compression, as hereinafter specified, shall be at least one and one-quarter inches thick, and shall be composed of crushed stone, gravel or crushed gravel, sand, stone dust or lime dust, and asphaltic cement, in the following proportions, by weight:

Passing a screen having 1" round openings and retained on a screen having $\frac{1}{2}$ " round openings.....	30% to 50% ;
Passing a screen having $\frac{1}{2}$ " round openings and retained on a screen having $\frac{1}{4}$ " square openings.....	15% to 25% ;
Passing a screen having $\frac{1}{4}$ " square openings and retained on a screen having 10 meshes to the linear inch..	6% to 17% ;
Passing a screen having 10 meshes to the linear inch.....	22% to 35% ;
Asphaltic Cement	5% to 7½% ;

Materials passing a 10-mesh screen shall conform to the following proportions by weight:

Passing a 200-mesh screen.....	10% to 18% ;
Passing an 80-mesh screen.....	30% to 45% ;
Passing a 40-mesh screen.....	60% to 80% .

For the purpose of these specifications, 1,000 pounds of Mineral Aggregate shall be considered as sufficient to cover 66 square feet of base surface.

Item 3. Finishing Course: The finishing course, after thorough compression, as hereinafter specified, shall be at least one-quarter inch in thickness, and shall be composed of sand and asphaltic cement, in the following proportions, by weight:

Sand, passing a 200-mesh screen.....10% to 20% ;

Sand, passing an 80-mesh screen, and

retained on a 200-mesh screen....20% to 30% ;

Sand, passing a 40-mesh screen and

retained on an 80-mesh screen.....30% to 40% ;

Sand, passing a 10-mesh screen, and

retained on a 40-mesh screen.....20% to 30%.

Asphaltic cement..... 8% to 12%.

For the purpose of these specifications, 1000 pounds of Finishing course mixture shall be considered as sufficient to cover 400 square feet of surface.

Item 4. Mixing and Laying:

(a) The plant wherein the materials are mixed, shall be provided with at least four separate bin compartments, for the storage of mineral aggregates.

All the mineral aggregate entering into the mixture shall be accurately weighed by means of multiple beam scales. Asphaltic cement shall be controlled and weighed separately from the mineral aggregate.

(b) All mineral aggregate shall be uniformly heated in suitable driers, to a temperature of between 300° and 400° Fahrenheit, previous to being conveyed to the mixer.

(c) The asphaltic cement shall be heated to such a temperature that, when discharged into the mixer, it shall have a temperature of not less than 200°, nor more than 300° Fahrenheit. At no time shall asphaltic cement be heated to a greater temperature than 325° Fahrenheit.

(d) Each batch of asphalt concrete shall be combined and mixed in the following manner: That portion of the mineral aggregate passing a $\frac{1}{2}$ " screen, including 200-mesh material, shall be placed in a mechanical mixer, of an approved type in proper proportions, together with 75% of the asphaltic cement specified to be used, and mixed for at least fifteen (15) seconds. The remainder of the asphaltic cement, and the remainder of the mineral aggregate, properly proportioned, shall then be added, and the entire mixture shall then be mixed until every particle of stone, sand, and dust, is thoroughly coated with asphaltic cement. The minimum length of time during which all the ingredients shall be in the process of actual mixing, shall be one (1) minute. The mixer paddles shall rotate at a rate of not less than seventy (70), nor more than eighty (80) revolutions per minute. An accurate timing device shall be provided for the proper timing of the mixing.

(e) The mixture, prepared as above specified, shall be brought to its place in the road in suitable conveyances covered with heavy canvas covers, and shall have a temperature when it reaches the work, of not less than 225°, nor more than 325° Fahrenheit. In dumping each load, at least 1-3 of said load shall be dumped outside of the space upon which it is to be spread. The material shall then at once be uniformly spread over the area designated by the Inspector, by means of hot shovels and rakes; while the wearing surface is being shoveled into place and spread by

raking, the shovelers and rakers shall keep off the spread material to avoid unevenness in compression.

(f) After any binder course has been uniformly spread, as above specified, it shall be given an initial compression by means of a tandem roller, weighing not less than three (3) tons. The binder course shall then immediately be covered with the finishing course.

(g) Immediately after the finishing course has been uniformly spread, as above specified, the pavement shall be rolled, with a steam roller, weighing not less than twelve (12) tons, and giving a compression of not less than 300 pounds per linear inch width of tire. The rolling shall continue until the surface is unyielding and true to grade and cross section. Such rolling must be continuous, and one roller must be provided for each 10,000 square feet of surface laid in any one working day. Immediately after final rolling, a thin layer of hot gravel or crushed stone screenings, all of which will pass a 4-mesh screen, and be retained on a 10-mesh screen, shall be spread evenly over the entire surface of the pavement and finally rolled. All places that may be inaccessible to the roller must be tamped with hot iron tampers. The resulting pavement must show a close grained, even and smooth surface, free from cracks or checks, and shall be true to grade and cross-section, and free from all hollows and inequalities. Except at grade changes, the finished surface, shall in no place vary more than one-quarter ($\frac{1}{4}$ ") inch from a five (5) foot straight edge laid parallel with the roadway.

(h) No traffic shall be allowed on the pavement until it has been thoroughly cooled and set. The Contractor will be held responsible for any damage to the pavement caused by traffic until the final acceptance of the work.

(i) No pavement shall be laid in rainy weather, or when wet from rain or other causes.

Item 5. CHARACTER OF MATERIALS:

(a) Crushed Stone or Gravel: Crushed stone or gravel shall be uniform in quality, free from oil, or organic matter, and any deposits or coatings or clay or lime. It shall show an average specific gravity of not less than 2.65. It shall be of such hard and tough material that it will show a "French co-efficient of wear" of not less than 10, after being tested in a Deval Abrasion Machine, according to the standards of the American Society of Testing Materials.

(b) Sand: Sand shall be clean, hard and sharp. It shall be free from organic matter, and shall not contain in excess of 5% by volume, of loam, or other earthy impurities, including mica.

(c) Stone or Lime Dust: Where the broken stone or gravel and sand do not contain the required amount of impalpable powder to produce the proportions of mineral aggregate specified, the deficiency shall be made up by the addition of stone or lime dust, or Portland cement. The stone or lime dust shall be a finely powdered limestone, or other hard and durable rock, and shall be of such fineness that all of it will

pass a 50-mesh screen, and at least sixty-six (66%) per cent will pass a 200-mesh screen.

(d) Asphaltic Cement:

1. The asphaltum used under these specifications must be prepared from the products of California crude asphaltic petroleum, and must be free from admixture with any residues obtained by the artificial distillation of coal, coal tar, or paraffine oil.

2. Penetration: Its "penetration" or consistency, determined by the use of a No. 2 needle in a New York Testing Laboratory Penetrometer, shall be as nearly as possible Forty-five (45°) degrees, with an allowable variation between the limits of forty (40°) degrees and fifty (50°) degrees, under a weight of one hundred (100) grams applied for five (5) seconds, at a temperature of seventy-seven (77°) degrees Fahrenheit.

3. Solubility: At least ninety-eight and one-half ($98\frac{1}{2}\%$) per cent of the asphaltum shall be soluble in cold carbon tetrachloride (CCl_4), and ninety-nine (99%) per cent in cold carbon bisulphide (CS_2); on ignition it shall show not more than fifteen (15%) per cent of fixed carbon; not less than eighty (80%) per cent, nor more than ninety-four (94%) per cent, shall be soluble in eighty-six (86°) degrees naphtha.

4. Ductility: This test shall be made upon a sample briquette one square centimeter (1 sq. cm.) in cross-section, and at a temperature of seventy-seven (77°) degrees Fahrenheit. The specimen shall show when elongated at the rate of five (5 cms.) centimeters per

minute, an elongation of not less than eighty (80 cms.) centimeters.

5. Evaporation: The evaporation from fifty (50) grams in five (5) hours, at three hundred and twenty-five (325°) degrees Fahrenheit in a cylindrical dish five and five-tenths (5.5 cm, 2-1/6 inches) centimeters in diameter, and three and five-tenths centimeters (3.5 cm., 1-1/3 inches) deep, in a standard oven, shall not be over three (3%) per cent. Penetration after evaporation shall not be less than fifty (50%) per cent of the original penetration.

SECTION VII. ASPHALTIC WEARING SURFACE, TYPE B.

(Applying to Item 4, of the Proposal)

(a) On the foundation prepared as hereinabove specified, shall be laid the Warrenite-Bithulithic wearing surface described below, so as to have the thickness indicated on the cross section, after thorough compression.

Said wearing surface shall be composed as follows: Of a mixture of gravel, sand, stone dust and Bitulithic Cement in sufficient quantities to make the mixture conform to the following proportions by weight:

Passing a screen having 1" round openings and retained on a screen having $\frac{1}{2}$ " round openings.....	30% to 50% ;
Passing a screen having $\frac{1}{2}$ " round openings and retained on a screen having $\frac{1}{4}$ " square openings.....	15% to 25% ;

Passing a screen having $\frac{1}{4}$ " square openings and retained on a screen having 10 meshes to the linear inch.. 6% to 17% ;
 Passing a screen having 10 meshes to the linear inch.....22% to 35%.

To the above shall be added

Bitulithic Cement.....5% to 7½%

Said materials passing a 10-mesh screen shall conform to the following proportions by weight:

Passing a 200-mesh screen.....10% to 18% ;

Passing an 80-mesh screen.....30% to 45% ;

Passing a 40-mesh screen.....60% to 80%,

and immediately after the above mixture has been spread and before it has been compacted in any manner, it shall be covered with a mechanically mixed, bituminous mixture, consisting of two and one-half ($2\frac{1}{2}$) pounds of Bitulithic Cement to twenty (20) pounds of mineral aggregate conforming to the above grading for materials passing a 10-mesh screen, and which mixture shall be spread at the rate of twenty-five (25) pounds per square yard of surface covered to completely seal the surface after compression.

(b) The gravel shall consist of clean waterworn pebbles, crushed boulders, or both, free from oil, organic matter and any deposits or coatings of clay or lime. It shall be uniform in quality and shall show an average specific gravity of not less than two and sixty-five hundredths (2.65). It shall be such hard tough material as will show a coefficient of wear of not less than ten (10) after being tested in the man-

ner hereinafter specified in the Deval Abrasion Machine.

At least thirty (30) pounds of the gravel shall be available for the tests. The gravel to be tested shall be selected as nearly uniform in size as possible, and a test sample shall consist of not less than forty-nine (49) nor more than fifty-one (51) pieces.

The total weight of gravel to be placed in each cylinder shall be five (5) kilogrammes (eleven pounds).

All test pieces shall be washed and thoroughly dried before weighing. Ten thousand (10,000) revolutions, at the rate of between thirty (30) and thirty-three (33) to the minute shall constitute a test. Only the percentage of the material worn off which will pass through a one-sixteenth ($1/16$) inch mesh screen, shall be considered in determining the amount of wear.

The wear shall be expressed by a coefficient known as the coefficient of wear, which coefficient shall be obtained by the formula "C" equals four hundred (400) divided by "W," where "C" is the coefficient and "W" the weight in grammes of the detritus under one-sixteenth ($1/16$) inch in size per kilogramme of gravel used.

The gravel used in the tests shall be furnished by the Contractor, and shall be delivered by him at the testing machine when required by the County Surveyor.

The sand shall be clean, hard grained and sharp, and shall not contain more than three (3) per cent by weight, of loam, clay or other earthy impurities, and shall all pass a screen having one-quarter ($1/4$) inch square openings.

If the gravel and sand do not contain enough finely divided particles or impalpable powder to produce the proportions of mineral aggregate specified, the deficiency shall be made up with the addition of stone dust.

The stone dust shall be finely powdered limestone or other hard and durable rock, or Portland Cement, as the Contractor elects, and shall be of such fineness that all of it will pass a fifty (50) mesh to the inch screen, and at least sixty-six (66) per cent will pass a two hundred (200) mesh to the inch screen.

(c) Bitulithic Cement is produced under the direction, laboratory supervision of, and using ingredients approved by, Warren Brothers Company, and in addition to the above, when refined from California crude liquid asphalt, shall also comply with the following standard tests, made in accordance with the methods adopted by the American Society for Testing Materials.

Penetration shall be determined in the manner specified by the American Society for Testing Materials, at the 1916 annual meeting and shall be not less than forty (40) nor more than fifty-five (55) hundredths centimeters, at seventy-seven (77) degrees Fahrenheit, using a No. 2 needle and under weight of one hundred (100) grams for five (5) seconds.

Twenty (20) grams of the Bithulithic Cement when heated for five (5) hours at a uniform temperature of three hundred twenty-five (325°) degrees Fahrenheit

in a cylindrical dish, six (6) centimeters inside diameter, in a draught free oven, shall show not more than one (1) per cent loss in weight. The residue when penetrated at seventy-seven (77°) degrees Fahrenheit shall show not less than fifty (50) per cent of the penetration of the original sample.

Not less than ninety-nine (99) per cent of the Bitulithic Cement shall be soluble in cold carbon bisulphide.

The amount of the Bitulithic Cement soluble in carbon tetrachloride shall be not less than ninety-nine (99) per cent of the amount which is soluble in carbon bisulphide.

The amount of the Bitulithic Cement which is soluble in California naphtha (gasoline) of sixty-two (62°) degrees Beaume gravity shall be not less than seventy-eight per cent.

Bitulithic Cement at forty (40°) degrees penetration shall show at least eighty (80) centimeters ductility at seventy-seven (77°) Fahrenheit, when tested by the District of Columbia method. An increase of two (2) centimeters ductility will be required for each five (5°) degrees penetration of the cement above fifty (50°) degrees.

(d) The different sizes of material shall be kept in at least four (4) separate bins. The proportioning of the various sizes shall be done by means of multiple beam scales. The gravel and sand shall be heated to a temperature not exceeding three hundred twenty-five (325°) degrees Fahrenheit.

The Bitulithic Cement shall be heated to a temperature of from two hundred (200°) to three hundred (300°) degrees Fahrenheit. Each batch shall be combined and mixed as follows: That portion comprising materials passing a $\frac{1}{2}$ " screen down to and including 200-mesh material, shall be placed in a mixer in the proper proportions and mixed for at least three (3) seconds, after which three-fourths ($\frac{3}{4}$) of the Bitulithic Cement specified to be used, shall be added and the mixing continued for at least fifteen (15) seconds. The remainder of the Bitulithic Cement and the remainder of the mineral aggregate, properly proportioned shall then be added and the entire mixture shall then be mixed for an additional sixty (60) seconds, and longer if necessary to coat all particles. Additional time shall be allowed for charging and emptying the mixer, in no event less than ten (10) seconds. The mixer paddles shall rotate not less than seventy (70) nor more than eighty (80) revolutions per minute. An accurate timing device shall be provided for the proper regulation of the mixing.

(e) The mixture shall be hauled to the street in canvas covered wagons or trucks and shall have a temperature when it reaches the street of between two hundred (200°) and three hundred (300°) degrees Fahrenheit. The base shall be clean and dry when the wearing surface is laid. All contact surfaces of curbs, gutters, manholes, and all cold pavement joints shall be painted with hot Bitulithic Cement before the surface is laid. At least one-third (1-3) of each load

shall be dumped outside of the space upon which it is to be spread and every portion of the load shall be placed and spread with hot shovels or forks. The surface shall then be leveled up with hot rakes. The surface material shall be spread to such a thickness that after receiving the final compression the finished wearing surface shall have a uniform thickness, unless otherwise specified, of one and one-half ($1\frac{1}{2}$) inches.

(f) Immediately after the surface has been spread it shall be rolled with a steam or gasoline roller giving a compression of three hundred (300) to three hundred fifty (350) pounds per linear inch width of tire, until the surface is unyielding, and true to grade and cross section. The wearing surface when completed shall have a specific gravity of not less than eighty-eight (88) per cent of the specific gravity of the combined gravel, sand and stone dust, as found in the mixture. The rolling must be continuous and one roller must be provided for each twelve hundred (1200) square yards of surface mixture laid in any working day.

(g) Except at grade changes, the surface after rolling shall in no place vary more than one-quarter ($\frac{1}{4}$) inch from a five (5) foot straight edge laid parallel with the roadway.

(h) After receiving the final compression, as above provided, there shall be spread over and rolled into the surface, sufficient hot Torpedo gravel to evenly cover the surface. The gravel shall be of such size

as will pass a one-quarter ($\frac{1}{4}$) inch mesh screen and of which at least fifty (50) per cent shall be retained on a ten (10) mesh to the inch screen.

(i) The pavement shall be kept barricaded until the day following its completion, when it shall be opened to traffic.

(j) No wearing surface shall be laid in rainy weather, or when the base course is wet from any cause.

(k) Warren Brothers Company, owner of the patents used in the construction of Warrenite-Bitulithic Pavement, shall file with the proper official or Board which is to receive bids for the work, a properly executed binding agreement to furnish to any contractor desiring to bid for the work, all the necessary Warrenite-Bitulithic wearing surface material mixed ready for use, at a definite price. Said license mixture agreement price shall provide for the use of all the patents required in the construction of the Warrenite-Bitulithic Pavement, as herein specified.

The execution of a contract for the work by the successful bidder and the County of Fresno shall be deemed by the Warren Brothers Company as binding said Warren Brothers Company to the agreement.

(l) The price bid for Warrenite-Bitulithic Pavement must include the laying and furnishing of all material, labor and implements necessary to complete the "wearing surface."

(m) In lieu of the gravel as mentioned in the foregoing specifications, it may be optional with the Con-

tractor to substitute broken stone in place of gravel. If broken stone is substituted, it shall be uniform in quality, shall not show more than five (5) per cent of stone having rounded surfaces, and shall be such hard, tough material as will show a coefficient of wear not less than ten (10) after being tested in the manner herein specified in the Deval Abrasion Machine.

At least thirty (30) pounds of coarsely broken stone, free from any fragments showing rounded or water-worn surfaces, shall be available for the tests. The rock to be tested shall be broken into pieces as nearly uniform in size as possible, and a test sample shall consist of not less than forty-nine (49) nor more than fifty-one (51) pieces.

SECTION VIII. ASPHALT CONCRETE PAVEMENT.

(Applying to Item 5 of Proposal)

Item 1. SUBGRADE. The subgrade shall be prepared as specified under Section IV herein, and allowed to dry. Pavement shall not be laid when the subgrade is wet, or shows any indication of being spongy, soft or unstable; loose dirt, trash, leaves or other foreign matter must be removed before any paving material is placed on the subgrade.

Item 2. CROSS-SECTION: The thickness of the pavement will be controlled by the cross-section shown on the plans; when final compression is attained, the top surface of the finished pavement shall conform to the grade and cross section indicated on the plans. The pavement shall be laid in two courses, or com-

pressions; the lower or base course shall be approximately three and one-half ($3\frac{1}{2}$ ") inches in thickness, after compression, and the top course shall be approximately one and one-half ($1\frac{1}{2}$ ") inches in thickness, after compression.

Item 3. BASE COURSE:

(a) Composition: The base course shall be composed of crushed stone, gravel or crushed gravel, sand, stone dust or lime dust, and asphaltic cement, in the following proportions by weight:

Passing a screen having $2\frac{1}{2}$ inch round openings, and retained on a screen having $1\frac{1}{2}$ inch round openings....	35% to 45% ;
Passing a screen having $1\frac{1}{2}$ inch round openings, and retained on a screen having $\frac{3}{4}$ inch round openings....	15% to 25% ;
Passing a screen having $\frac{3}{4}$ inch round openings, and retained on a screen having 10 meshes to the inch....	10% to 20% ;
Passing a screen having 10 meshes to the linear inch.....	20% to 30% ;
Asphaltic cement	4% to 9%.

Materials passing the 10-mesh, shall conform to the following proportions by weight:

Sand, passing a 200-mesh screen....	5% to 10% ;
Sand, passing an 80-mesh screen, and retained on a 200-mesh screen.....	20% to 35% ;
Sand, passing a 40-mesh screen, and retained on an 80-mesh screen.....	35% to 45% ;
Sand, passing a 10-mesh screen, and retained on a 40-mesh screen.....	20% to 30%.

For the purpose of these specifications, 1000 pounds of asphalt concrete composition for base course, shall be considered as sufficient to cover 24 square feet of roadway.

(b) Mixing and Laying:

(1) The plant wherein the materials are mixed, shall be provided with at least four separate bin compartments, for the storage of mineral aggregates.

All the mineral aggregate entering into the mixture shall be accurately weighed by means of multiple beam scales. Asphaltic cement shall be controlled and weighed separately from the mineral aggregate.

(2) All mineral aggregate shall be uniformly heated in suitable driers, to a temperature of between 300° and 400° Fahrenheit, previous to being conveyed to mixer.

(3) The asphaltic cement shall be heated *so* such a temperature that, when discharged into the mixer, it shall have a temperature of not less than 200°, nor more than 300° Fahrenheit. At no time shall asphaltic cement be heated to a greater temperature than 325° Fahrenheit.

(4) Each batch of asphalt concrete shall be combined and mixed in the following manner: That portion of the mineral aggregate passing a $\frac{3}{4}$ inch screen, including 200-mesh material, shall be placed in a mechanical mixer, of an approved type, in proper proportions, together with 75% of the asphaltic cement specified to be used, and mixed for at least fifteen (15) seconds. The remainder of the asphaltic

cement, and the remainder of the mineral aggregate, properly *proportioned*, shall then be added, and the entire mixture shall then be mixed until every particle of stone, sand, and dust, is thoroughly coated with asphaltic cement. The minimum length of time during which all the ingredients shall be in the process of actual mixing, shall be one (1) minute. The mixer paddles shall rotate at a rate of not less than seventy (70), nor more than eighty (80) revolutions per minute. An accurate timing device shall be provided for the proper timing of the mixing.

(5) The mixture, prepared as above specified, shall be brought to its place in the road in suitable conveyances covered with heavy canvas covers, and shall have a temperature when it reaches the work, of not less than 225°, nor more than 325° Fahrenheit. In dumping each load, at least $\frac{1}{3}$ of said load shall be dumped outside of the space upon which it is to be spread. The material shall then at once be uniformly spread over the area designated by the Inspector, by means of hot shovels and rakes; while the asphalt concrete is being shoveled into place and spread by raking, the shovelers and rakers shall keep off the spread material to avoid unevenness in compression.

(6) Immediately after the asphalt concrete has been uniformly spread, as above specified, the pavement shall be rolled with a steam roller, weighing not less than twelve (12) tons, and giving a compression of not less than 300 pounds per linear inch width of tire. The rolling shall continue until the

surface is unyielding and true to grade and cross section. Such rolling must be continuous, and for that purpose two (2) rollers must be in constant operation on the work. One of said rollers shall be a steam roller weighing not less than twelve (12) tons, as above specified, and the other must be a steam tandem roller, weighing not less than five (5) tons. All places that may be inaccessible to the rollers must be tamped with *hiot* iron tampers. The resulting pavement must show a close grained, even and smooth surface, free from cracks or checks, true to grade and cross-section, and free from all hollows and inequalities.

(7) Except such traffic as may be necessary for construction purposes, no traffic shall be allowed on the base course. The Contractor will be held responsible for any and all damages to any asphalt concrete pavement, either base or top, until final acceptance of the whole work.

(8) Unless permission is given by the County Surveyor, not more than three (3) days shall elapse from the time any base is completed, before the top or wearing surface shall be laid.

(9) No asphalt concrete shall be laid in rainy weather, or when wet from rain or other cause.

(c) Character of Materials: The character of all materials entering into the base course construction shall be the same as specified under Item 5, of Section VI, Asphalt Wearing Surface, Type A.

Item 4. WEARING SURFACE:

Type A.

Specifications to control the mixing and laying of

wearing surface, Type A, shall be the same as set forth under Section VI, Asphalt Wearing Surface, Type A.

* * * * *

shall state the whole compensation, including the value of extra work according to the terms of the contract, accruing to the Contractor; the County Surveyor's certificate shall also carry with it a recommendation as to the acceptance of the contract by the Board of Supervisors. If an acceptance by the Board of Supervisors shall follow, the said Board shall, at any time after thirty-five (35) days after acceptance, pay to the Contractor, the total amount of money remaining due, after deducting from the amount or value named in the County Surveyor's certificate, all such sums as shall have been previously paid to the Contractor under any of the provisions of this contract, and also such sums of money as by the terms of this agreement the County is authorized to reserve and retain

(b) It is further agreed that nothing herein contained shall be construed to affect the right hereby reserved by the said Board of Supervisors, to reject the whole or any part of the aforesaid work, should the County Surveyor's certificate be found to be inconsistent with the terms of this agreement, or otherwise improperly given, or should defects appear due to faulty construction or material.

(c) It is mutually agreed between the parties hereto that no certificate given, or payments made under this contract, except the final certificate, or final payment, shall be conclusive evidence of the performance

of this contract, either wholly or in part, against any claim of the party of the first part, and then not until the lapse of thirty-five (35) days after acceptance of the work by the Board of Supervisors, and no payment shall be construed to be an acceptance of any defective work or improper materials.

(d) And the said Contractor hereby further agrees that the payment of the final amount due under this contract, and the adjustment and payment of the bill rendered for any work done in accordance with any alterations of the same, shall release the County of Fresno, the Board of Supervisors, and the County Surveyor, from any and all claims, or liability on account of work performed under this contract, or any alteration thereof.

IN WITNESS WHEREOF, the parties to these presents have hereunto set their hands the year and date first above written, being authorized thereto.

COUNTY OF FRESNO.

By Chris Jorgensen
Chairman Board of Supervisors.
Thompson Bros
C. M. Thompson
O. M. Thompson
E. O. Thompson
Contractor.

Attest:

D. M. BARNWELL,
County Clerk and ex-Officio
Clerk of the Board of Su-
pervisors.

By J. R. Schaeffer
Deputy.

(Seal)

BOND FOR THE FAITHFUL PERFORMANCE OF CONTRACT

KNOW ALL MEN BY THESE PRESENTS:

That we O. M. Thompson, C. M. Thompson and E. O. Thompson AS PRINCIPAL.. and H. E. Vogel and J. B. Hill AS SURETies are held and firmly bound unto the COUNTY OF FRESNO, State of California, in the sum of Nine Hundred Dollars (\$900.00) for the payment of which sum, well and truly to be made, we bind ourselves, jointly and severally, firmly by these presents.

The condition of the foregoing obligation is such that whereas said principals have been awarded and are about to enter into the annexed contract with the COUNTY OF FRESNO, State of California, and are required by said County to give this bond in connection with the execution of said contract;

Now, Therefore, if the said principals shall well and truly do and perform all the covenants and obligations of said contract on their part, to be done and performed at the times and in the manner specified therein, then this obligation shall be null and void, otherwise it shall be and remain in full force and effect.

Witness our hands this 4th day of November 1920.

	Thompson Bros	
	By C. M. Thompson	
O. M. Thompson	— E. O. Thompson	
		Principal.
	H. E. Vogel	
		Surety.
	J. B. Hill	
		Surety.

Approved this 5th day of Nov, 1920

Chris Jorgensen
Chairman of the Board of Supervisors, County of
Fresno, State of California.

ACKNOWLEDGEMENT IN CASE OF PERSONAL SURETY

STATE OF CALIFORNIA, }
COUNTY OF FRESNO. }ss.

On this 4th day of November, in the year of our Lord, One Thousand Nine Hundred and Twenty, before me, D. M. Barnwell, County Clerk, in and for said County and State, residing therein, duly commissioned and sworn, personally appeared H. E. Vogel and J. B. Hill, known to me to be the persons described in, and whose names are subscribed to the within bond and they acknowledged to me that they executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my Official Seal, the day and year in this certificate above written.

(Seal)

D. M. Barnwell, Clerk
By J. R. Schaeffer, Deputy

In and for the County of Fresno, State of California.

AFFIDAVIT IN CASE OF PERSONAL SURETY

STATE OF CALIFORNIA, }
COUNTY OF FRESNO. }ss.

J. B. Hill and, H. E. Vogel, sureties in the foregoing undertaking, being severally duly sworn, each for himself, deposes and says, that he is a resident and freeholder within said State, and is worth the sum mentioned in the foregoing bond over and above all his just debts and liabilities, in property not exempt from execution.

J. B. Hill
H. E. Vogel

Subscribed and sworn to before me this 4th day of November, 1920.

(Seal)

D. M. Barnwell, Clerk
By J. R. Schaeffer,
Deputy Clerk.

BOND FOR THE SECURITY OF MATERIAL-MEN, LABORERS AND OTHERS

KNOW ALL MEN BY THESE PRESENTS:

That we O. M. Thompson, C. M. Thompson and E. O. Thompson AS PRINCIPAL.. and H. E. Vogel and J. B. Hill AS SURETIES are held and firmly bound unto the COUNTY OF FRESNO, State of California, in the sum of Eighteen Hundred Dollars (\$1,800/00), lawful money of the United States, for the payment of which sum, well and truly to be made, we bind ourselves jointly and severally, firmly by these presents.

The condition of the above obligation is such that whereas said principals have been awarded, and are about to enter into the annexed contract with said County of Fresno, and they are required by said County to give this bond in connection with the execution of said contract;

NOW, THEREFORE, if said principals as Contractor in said contract, or his or its sub-contractor, fail.. to pay for any materials, provisions, provender or other supplies, or teams used in, upon, for or about the performance of the work contracted to be done, or for any work or labor done thereon of any kind, that the sureties will pay the same in an *amount* not exceeding the sum specified in this bond; and also, in case suit is brought upon this bond, a reasonable attorney's fee, to be fixed by the court.

Witness our hands this 4th day of November 1920

Thompson Bros

By C. M. Thompson

O. M. Thompson E. O. Thompson

Principal.

H. E. Vogel

Surety.

J. B. Hill

Surety.

Approved this 5th day of November 1920

Chris Jorgensen

Chairman of Board of Supervisors, County of Fresno,
State of California.

[Endorsed]: FILED Feb 15 1921. CHAS. N. WILLIAMS, Clerk By R S Zimmerman Deputy Clerk.

[TITLE OF COURT AND CAUSE.]

ANSWER.

Now come the above named defendants C. M. Thompson, O. M. Thompson, E. O. Thompson, Copartners doing business under the firm name and style of Thompson Bros., H. E. Vogel and J. B. Hill, and answering the Bill of Complaint in said suit, deny, admit and allege as follows:

I.

Deny that heretofore or prior to the 28th day of June, 1909, or at any time, one Edwin C. Wallace was the original, first sole or any inventor of any new or useful improvement in street pavements; deny that the same was not known or used by others in this country before said Wallace's alleged invention or pretended discovery thereof; deny that the same was not known or used by others more than two years prior to said Wallace's alleged application for Letters Patent of the United States; deny that the same was not in public use or on sale in this country for more than two years prior to said Wallace's alleged application for Letters Patent; deny that the same was not abandoned; deny that thereupon or at any time said Wallace made application to the Commissioner of Patents of the United States in due form of law for Letters Patent of the United States; admit that on May 31, 1910, pretended Letters Patent of the United States No. 959,976 were attempted and purported to be granted to said Wallace, but deny that the same were issued either duly or regularly, or in accordance with the law in such cases made and provided, and deny that by said pretended Letters Patent there was granted or secured to said Wallace or his heirs or assigns the exclusive or any right to make, use or sell any alleged invention throughout the United States or its territories or any

part thereof for the full term of seventeen (17) years, or for any time or period whatsoever.

II.

Allege that they are not sufficiently informed whether the said Wallace on April 1, 1912, or at any time, by an instrument in writing, or otherwise, assigned to plaintiff all or any of his alleged entire right, title or interest in or to said pretended Letters Patent; and deny upon information and belief that plaintiff has such title in said pretended Letters Patent as to enable it to maintain this suit.

III.

Deny that any alleged composite *payment* or pretended invention was either new or useful; deny that the same was neither known or used by others in this country before the pretended invention or pretended discovery thereof by the said Wallace; deny that the same was neither patented nor described in any printed publication in this or any foreign country before the alleged invention and pretended discovery thereof by the said Wallace; deny that the same was neither patented nor described more than two years before the alleged application for pretended Letters Patent therefor; deny that at the time of said Wallace's alleged application for pretended Letters Patent therefor, the same had not been in public use or on sale in the United States for more than two years, or was not patented or caused to be patented by him or by his legal representatives or assigns in any foreign country upon an application which was filed more than twelve (12) months prior to the filing of his said application in this country; deny that the same had not been abandoned by said Wallace.

IV.

Deny that the said pretended invention alleged to be covered by said pretended Letters Patent is of any

or great commercial value or of any practical, or other utility; deny that the trade or public generally or at all have acquiesced in the validity of said pretended Letters Patent or have recognized the alleged rights of plaintiff under the same; deny that many or any cities or contractors are regularly or at all paying, royalties for the use thereof; deny that if plaintiff can receive legal protection against infringers of said pretended Letters Patent the same would be of much or any value to plaintiff, or that large or any profits would accrue therefrom to plaintiff; deny that since the alleged acquirement by plaintiff of the alleged rights under said pretended Letters Patent, plaintiff has been extensively or at all engaged throughout the United States in the manufacture or construction of pavements embodying said pretended invention, or has expended large sums or any sums of money in or about manufacturing pavements under said pretended Letters Patent or in further introducing said pretended improvement into actual or any use; deny that plaintiff has caused such pavements to be extensively, or at all put upon the market or has expended much time, labor or money with respect to said pretended invention in introducing same to the public; deny that plaintiff has created a great or any demand or large or any market therefor; deny that plaintiff has the exclusive right to supply any demand under said pretended Letters Patent; deny that plaintiff has a large number of employes engaged in the construction of said pretended pavements; deny that plaintiff retains for itself or its licensees any legal exclusive right to make, construct,

use or sell pavements embodying said alleged invention; deny that said alleged invention has proved of great value, or that plaintiff will realize any gain or profit from the exclusive enjoyment of any rights, to the same and deny that there has been any infringement of the same by defendants.

V.

Deny that Specifications No. 1 presented by the County Surveyor for "part of Route 5, Section A, Fresno County Highway System," and adopted by the County of Fresno governing the laying of so-called "Section VI Asphalt Wearing Surface, Type A" for said part of Route 5, Section A, Fresno County Highway System, contain or contains the alleged inventions or any thereof allegedly covered or allegedly secured by said pretended United States Letters Patent No. 959,976.

VI.

Admit that plaintiff filed with the County of Fresno, to wit, the Board of Supervisors thereof, a certain pretended license, copy of which constitutes Exhibit No. 3 to the Bill of Complaint herein, but allege that said license was not accepted and was rejected by said County of Fresno and the Board of Supervisors thereof.

VII.

Admit that defendants C. M. Thompson, O. M. Thompson, E. O. Thompson, Co-partners doing business under the firm name and style of Thompson Bros., in response to a notice to contractors made and published by the Board of Supervisors of the County of

Fresno on or about September 30, 1920, submitted a proposal for the improvement of that portion of Fresno County Highway System, indicated as part of Route 5, Section A, towit, that portion of Blackstone Avenue, in the County of Fresno, State of California, adjoining the city boundary of the City of Fresno, and running northerly therefrom for a distance of approximately six hundred (600) feet from the city boundary; admit that on or about November 5, 1920, said defendants entered into a contract with the County of Fresno, towit, the Board of Supervisors thereof, for laying and constructing a pavement or roadway upon the said part of Route 5, Section A, Fresno County Highway System, but deny that either by the terms of said contract or at any time or at all said defendants either agreed to lay or construct, or have laid or constructed thereon, any pavement containing the alleged invention set forth in said pretended Letters Patent, and deny that said contract was entered into with any intent or conspiracy to injure plaintiff or to deprive it of any profits, benefits or advantages to which it was entitled; admit that in accordance with the terms and requirements of said contract and the laws of the State of California, the said defendants executed their "BOND FOR THE FAITHFUL PERFORMANCE OF SAID CONTRACT" with defendants H. E. Vogel and J. B. Hill as sureties thereon and executed their "BOND FOR THE SECURITY OF MATERIAL, MEN, LABORERS AND OTHERS" with the defendants

H. E. Vogel and J. B. Hill as sureties thereon; and admit that "Exhibit No. 5" attached to the Bill of Complaint herein constitutes a copy of said proposal, contract, specifications and bonds.

VIII.

Deny that under or by the terms of said contract or bonds or at all the said defendants, or any of them, have contracted or agreed or undertaken to or have made or used or sold any pavement or structure that is the alleged invention allegedly described or allegedly claimed by plaintiff under or in said pretended Letters Patent No. 959,976; deny that any such pavement so contracted to be laid or constructed by defendants embodies or uses any alleged invention allegedly covered by said pretended Letters Patent; and in that behalf defendants allege that by the aforesaid contract and specifications it was provided that the WEARING SURFACE laid on the aforesaid part of Route 5, Section A, Fresno County Highway System, should constitute ASPHALT WEARING SURFACE, TYPE A, identified in said "Exhibit No. 5" and that the mixing and laying of said WEARING SURFACE should conform and did conform and was controlled by the specifications for said "ASPHALT WEARING SURFACE, TYPE A", appearing beginning at page 14 of said "Exhibit No. 5"; and that the laying of the WEARING SURFACE on said part of Route 5, Section A, Fresno County Highway System has conformed to said specifications for ASPHALT WEARING SURFACE, TYPE A; and de-

defendants allege that said ASPHALT WEARING SURFACE, TYPE A, is not, nor is the laying of the same, in any manner an infringement upon said pretended Letters Patent No. 959,976.

IX.

Defendants deny that they have received any legal notice of any alleged infringement of said pretended Letters Patent; deny that defendants have committed any act of infringement of said pretended Letters Patent upon said part of Route 5, Section A, Fresno County Highway System; deny that said County of Fresno is planning or threatening to commit any other or similar acts of alleged infringement; deny that plaintiff will suffer any damage or be deprived of any gains or profits, or suffer any irreparable injury to itself because of any alleged infringement by defendants.

X.

Answering Paragraph XII of the Bill of Complaint on file herein, defendants allege that the large areas of pavement referred to therein as manufactured and constructed by plaintiff for the County of Fresno were manufactured and constructed by plaintiff under the monopoly asserted by plaintiff as owner of United States Letters Patent No. 727,505, granted May 5, 1903, to Frederick John Warren; that said United States Letters Patent No. 727,505, expired by law on May 5, 1920, and that plaintiff has surreptitiously and fraudulently and intentionally endeavored to continue to exercise the monopoly heretofore asserted under the guise of said expired Letters Patent No.

727,505 by filing with the County of Fresno and other bodies politic, both in the State of California, and throughout the United States, pretended licenses in form similar to the aforesaid Exhibit No. 3 wherein the "certain patents" referred to therein are not designated by date or number; that this practice of plaintiff has been carried on with the fraudulent intent of inducing bodies politic to pay unto plaintiff sums of money under the belief that plaintiff is now the legal possessor of the monopoly in fact terminated with the expiration of said Letters Patent No. 727,505; that in fact plaintiff now possesses no Letters Patent which in any manner warrants plaintiff in filing pretended "license agreements" corresponding to the aforesaid Exhibit No. 3 and that the practice of plaintiff in so doing is fraudulent and intended to mislead bodies politic and lawful competitors.

XI.

Answering Paragraph XIII of said Complaint, defendants deny that plaintiff has for many years or at all been engaged in the business of manufacturing, or under its supervision or direction, licensing the manufacturing or laying of pavements embodying the alleged claims allegedly stated in said pretended Letters Patent No. 959,976, or that plaintiff has built up a large or profitable or any business in that behalf; deny that the laying of said pavement provided for in the aforesaid contract of November 5, 1917, will or has resulted in any grave or other injury or damage to plaintiff; deny that any pavements which

plaintiff may have any right to exclude others from manufacturing will be laid or attempted to be laid by defendants herein, either under the claim or pretense that said pavements are manufactured by plaintiff or under the supervision or direction of plaintiff, or laid in accordance with pretended Letters Patent No. 959,976, or at all, or to the great or any injury or damage to plaintiff.

XII.

Deny that any proceedings are now or at any time prior hereto or hereinafter pending before the officers of the County of Fresno for the improvement of streets under the aforesaid specifications described as "Specifications, Section VI, ASPHALT WEARING SURFACE, TYPE A," which embody or necessitate in any manner the use or employment of any alleged invention claimed by plaintiff or embodied in pretended Letters Patent No. 959,976; deny that plaintiff as the pretended owner of pretended Letters Patent No. 959,976, has any exclusive right to make, use or sell any said alleged invention in said County of Fresno or has any exclusive right to lay or construct the type of ASPHALT WEARING SURFACE prescribed under "Section VI" of said Specifications as "ASPHALT WEARING SURFACE, TYPE A"; deny that because of any wrongful claims or threats or actions of defendants, the right of competitors or others to enter into such contracts or to perform the same are hindered or interfered with and deny that plaintiff will lose any lawful opportunity of get-

ting any such work so proposed; deny that by any unlawful act of defendants, or either of them, plaintiff has suffered or will suffer any damage or injury.

XIII.

Deny that defendants have heretofore infringed upon said pretended Letters Patent No. 959,976 in any manner whatsoever; deny that defendants are contemplating or intending to ever infringe upon the same and deny that unless restrained by a writ of injunction or otherwise defendants will continue to infringe upon said pretended Letters Patent or will induce or lead others to infringe upon the same.

XIV.

Further answering defendants allege that said pretended Letters Patent No. 959,976, and each of the claims thereof, are invalid and void for the following reasons:

(A) In view of the following Letters Patent:

UNITED STATES PATENTS

NAME	DATE	NUMBER
John P. Cranford	Mar. 23, 1869	88,139
Davis W. Bailey	Nov. 23, 1869	97,149
Samuel R. Scharf	Jan. 24, 1871	111,151
Z. Waters & H. R. Bellamy	Dec. 31, 1872	134,500
N. B. Abbott	June 17, 1873	139,848
S. J. Davenport & J. Ward	Oct. 28, 1873	143,965
Andrew B. Dean	Mar. 23, 1875	161,013

H. R. Bellamy	July 13, 1875	165,530
William H. Jones	Oct. 19, 1875	169,005
S. R. Scharf	April 18, 1876	176,360
S. R. Scharf	April 25, 1876	176,696
Antonio Pelletier	May 23, 1876	177,744
H. Wibben	Dec. 19, 1876	185,609
J. G. Stafford & J. W. Phillips	Feb. 27, 1877	187,926
A. B. Dean	July 30, 1878	206,426
S. E. Gross	Oct. 7, 1879	220,234
Davis W. Bailey	May 18, 1880	
	(Reissue)	9,207
A. McKinley	May 22, 1883	278,031
G. C. Harkins	June 3, 1884	299,924
John G. Ketcham	June 7, 1887	364,594
James Stansfield	Dec. 20, 1887	375,018
E. J. DeSmedt	Dec. 20, 1887	375,273
G. A. Bayard	Apr. 24, 1888	381,667
Amzi L. Barber	Oct. 16, 1888	391,222
William C. Murdock	Aug. 6, 1889	408,250
T. F. Hagerty	Oct. 22, 1889	413,278
H. Van Newkirk	Oct. 1, 1895	547,097

NAME	DATE	NUMBER
F. J. Warren	June 4, 1901	675,430
S. Whinery	June 4, 1901	675,694
F. A. Malette & E. Seybolt	Sept. 24, 1901	683,056
F. A. Malette	Jan. 21, 1902	691,708
F. J. Warren	Mar. 11, 1902	695,421

F. J. Warren	Mar. 11, 1902	695,422
F. J. Warren	Mar. 11, 1902	695,423
Walter S. Wilkinson	July 29, 1902	705,728
Daniel P. Mullen	Mar. 3, 1903	721,906
F. J. Warren	May 5 1903	727,505
F. J. Warren	May 5, 1903	727,509
F. J. Warren	May 5, 1903	727,510
F. J. Warren	May 5, 1903	727,511
F. J. Warren	May 5, 1903	727,512
William Wilson	Dec. 29, 1903	748,247
W. Wilson	Dec. 29, 1903	748,248
August E. Schutte	Aug. 20, 1904	768,699
G. W. & W. T. S. Crich- field	Aug. 15, 1905	797,408
Frederick J. Warren	Sept. 12, 1905	799,619
John C. Butterfield	Dec. 26, 1905	808,339
J. I. McDonald	Mar. 13, 1906	814,797
T. N. Badger	Aug. 21, 1906	829,247
P. C. Reilly	Aug. 21, 1906	829,294
Walter S. Wilkinson	Nov. 13, 1906	836,059
S. G. Howe	Jan. 29, 1907	842,201
W. E. Hassam	July 30, 1907	861,650
Herman J. Ruffi	Aug. 13, 1907	863,096
J. D. Henderson	Oct. 22, 1907	869,181
J. L. Rake & C. Rich- ardson	Dec. 31, 1907	875,288
George A. Mitchell	Jan. 14, 1908	876,377
W. S. Houghton	May 26, 1908	888,886
F. F. Williamson & D. Brennan	Jan. 12, 1909	909,499

NAME	DATE	NUMBER
B. F. Richardson	Feb. 2, 1909	911,445
Amzi L. Barber	Mar. 16, 1909	915,062
F. S. Hutchinson	Apr. 13, 1909	918,156
Joseph H. Amies	Aug. 31, 1909	932,941
J. C. Travilla	Oct. 12, 1909	936,493
Joseph H. Amies	Nov. 30, 1909	941,548
Joseph H. Amies	Jan. 4, 1910	945,071
Clifford Richardson	Jan. 10, 1911	981,225
Jules Lassailly	Mar. 28, 1911	987,726

BRITISH LETTERS PATENT

NUMBER	YEAR
10,841	1896
17,483	1897
15,992	1906
1,568	1873
3,940	1883
12,729	1849
548	1871

(B) Because in view of the state of the art at the date of the alleged invention of the said Wallace, and long prior to that time, the matters and things purported to be patented and claimed in said pretended Letters Patent No. 959,976 were not patentable inventions but were mere expedients requiring no invention and within the domain of mere judgment and skill in the art, and comprise a mere unpatentable

aggregation of means and expedients well known and long used in the art long prior to said Wallace's alleged invention thereof, the selection and use of which required only the ordinary mechanical or trade skill of those skilled in the art to which said alleged inventions pertain and did not involve or require invention.

(C) Because the alleged claims of said pretended Letters Patent No. 959,976 do not cover new or patentable combinations but mere aggregations of old mechanical things and elements, producing no new result or effect.

(D) Because for the purpose of deceiving the public, the description and specification of the said alleged invention and discovery filed by said Wallace in the Patent Office of the United States for said pretended Letters Patent No. 959,976 was made to contain less than the whole truth relative to his said pretended invention or discovery and because the said specification does not show the method of making and using the said alleged invention in such full, clear and exact terms as to enable any person skilled in the art or science to which it pertains to make and use the same.

XV.

Further answering defendants allege that in view of the patents specifically referred to in Paragraph XIV, sub-A the claims of said pretended Letters Patent No. 959,976 must be so restricted as to exclude from the purview thereof the aforesaid ASPHALT WEARING SURFACE, TYPE A.

XVI.

Further answering defendants allege that prior to the alleged invention by said Wallace as in the Bill of Complaint alleged, and more than two years prior to the application for said pretended Letters Patent No. 959,976, every material or substantial part of said alleged invention or inventions purported to be claimed as new in said pretended Letters Patent had been known and publicly used by others in this country and for more than two years prior to said application, towit: by Capt. W. H. Worswick of San Francisco, at San Francisco, California, Palo Alto, California, Visalia, California, Chicago, Illinois, and Oakland, California, and elsewhere in the United States; and by City of Visalia, State of California, in said City of Visalia.

XVII.

Further answering defendants allege that during the pendency in the United States Patent Office of the application upon which said alleged Letters Patent No. 959,976 issued, the patentee so limited the claims of the said alleged patent, in order to obtain favorable consideration of the same, that plaintiff cannot now ask for, or obtain, an interpretation of those claims, or either of the same, which will bring the said ASPHALT WEARING SURFACE, TYPE A complained of within the scope thereof.

XVIII.

That in view of the prior art at and before the date of the alleged invention or inventions purported

to be patented in either or both of the claims of said pretended Letters Patent No. 959,976, said claims and neither of said claims can be given an interpretation which will bring the aforesaid ASPHALT WEARING SURFACE, TYPE A, complained of within the scope thereof.

WHEREFORE, defendants having fully answered to the Bill of Complaint, deny that the plaintiff is entitled to the relief demanded, or any part thereof, and pray that the Bill of Complaint herein be dismissed with costs in this behalf most wrongfully sustained.

C. M. THOMPSON
O. M. THOMPSON
E. O. THOMPSON

Co-partners doing business
under the firm name and
style of THOMPSON
BROS.,

and

H. E. VOGEL and
J. B. HILL

Defendants.

By Leonard S. Lyon.

Frederick S. Lyon.

Leonard S. Lyon.

Solicitors and of Counsel
for Defendants

[Endorsed]: Received copy 4/12/20 Paul S. Hon-
berger Solicitor for Pff FILED APR 12 1921 CHAS.
N. WILLIAMS, Clerk By P. W. Kerr, Deputy
Clerk

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF CALIFORNIA
SOUTHERN DIVISION

WARREN BROTHERS COM-)
PANY, a Corporation,)

Plaintiff)

vs.)

IN EQUITY

C. M. THOMPSON, O. M.)
THOMPSON, E. O. THOMP-)
SON, Co-partners doing business)
under the firm name and style)
of THOMPSON BROS.; H. E.)
VOGEL and J. B. HILL,)

NO. F-1

Defendants)

.

PETITION FOR LEAVE TO INTERVENE

Now comes the County of Fresno, a body politic
and corporate of the State of California, and brings
this its Petition to this Honorable Court, for Leave
to Intervene in the above entitled suit and to be joined
as a party defendant therein for the purpose of de-
fending the same and resisting the claims of the
plaintiff, and in that behalf your Petitioner shows:

I.

That your Petitioner is a body politic and corporate of the State of California, and is the County of Fresno referred to in the Bill of Complaint in the above entitled suit, particularly at Paragraph VI of said Bill of Complaint and otherwise therein.

II.

That the above entitled suit was begun on February 15, 1921, by the filing on that day of a Bill of Complaint by Warren Brothers Company, a Corporation, as plaintiff, against C. M. Thompson, O. M. Thompson, E. O. Thompson, Co-partners doing business under the firm name and style of Thompson Bros., H. E. Vogel and J. B. Hill, as defendants, wherein and whereby it was alleged that the said plaintiff was the owner and holder of certain Letters Patent of the United States No. 959,976 issued on May 31, 1910, to one Edwin C. Wallace, and thereafter duly assigned to the plaintiff on April 1, 1912, and that ever since the last named day plaintiff has been the sole owner and holder of the said Letters Patent and of all the rights and liberties granted thereby, and is entitled to all damages occasioned by the infringement of said Letters Patent.

III.

That on September 27, 1920, your Petitioner by its Board of Supervisors duly adopted certain specifications for the improvement of part of Route 5, Section A, FRESNO COUNTY HIGHWAY SYSTEM, a copy of which specifications No. 1 is included in

“Exhibit No. 5” attached to the aforesaid Bill of Complaint.

IV.

That your Petitioner on September 30, 1920, by its Board of Supervisors, caused a notice to contractors to be published inviting sealed proposals for the construction of work on part of Route 5, Section A, FRESNO COUNTY HIGHWAY SYSTEM, towit, that portion of Blackstone Avenue, in the County of Fresno, State of California, adjoining the city boundary of the City of Fresno, and running northerly therefrom for a distance of approximately six hundred (600) feet from the city boundary, a copy of said notice being attached to the aforesaid Bill of Complaint as “Exhibit No. 4”; that defendants C. M. Thompson, O. M. Thompson, E. O. Thompson, as Co-partners doing business under the firm name and style of Thompson Bros., submitted a proposal for the construction of said work and was awarded, by your Petitioner, a contract for the performance of said work on said part of Route 5, Section A; that in accordance with the terms and requirements of said contract and the laws of the state of California, the said defendants C. M. Thompson, O. M. Thompson, E. O. Thompson, as Co-partners, doing business under the firm name and style of Thompson Bros., executed their BOND FOR THE FAITHFUL PERFORMANCE OF SAID CONTRACT with H. E. Vogel and J. B. Hill, defendants to the aforesaid suit, as sureties thereon, and the said defendants C. M.

Thompson, O. M. Thompson, E. O. Thompson, as Co-partners, doing business under the firm name and style of Thompson Bros., executed their BOND FOR THE SECURITY OF MATERIAL, MEN, LABORERS AND OTHERS, to your Petitioner, with the defendants H. E. Vogel and J. B. Hill as sureties thereon; a copy of said proposal, contract, specifications and bonds being attached to the aforesaid Bill of Complaint as "Exhibit No. 5".

V.

That by the aforesaid contract and specifications it was provided that the WEARING SURFACE laid on the aforesaid part of Route 5, Section A, FRESNO COUNTY HIGHWAY SYSTEM, should constitute the ASPHALT WEARING SURFACE, TYPE A, identified therein and that the mixing and laying of said WEARING SURFACE should conform to and be controlled by the specifications for said ASPHALT WEARING SURFACE, TYPE A, appearing beginning at page 14 of said "Exhibit No. 5"; and that the laying of the WEARING SURFACE on said part of Route 5, Section 5, FRESNO COUNTY HIGHWAY SYSTEM under said contract has conformed to said specifications for ASPHALT WEARING SURFACE, TYPE A.

VI.

That your Petitioner is advised and believes that the mixing and laying of said ASPHALT WEARING SURFACE, TYPE A, in the manner prescribed in the specifications therefor appearing beginning at page

14 of said "Exhibit No. 5" is in no manner an infringement upon the aforesaid Letters Patent of the United States No. 959,976 in suit, or either of the claims thereof; and that the pavement, and particularly the WEARING SURFACE thereof as laid upon the aforesaid part of Route 5, Section A, FRESNO COUNTY HIGHWAY SYSTEM, in no manner constitutes an infringement of said Letters Patent in suit, or either of the claims thereof, nor does the same constitute in any manner any violation of any rights of the plaintiff to said suit.

VII.

That your Petitioner has openly retained counsel to defend the aforesaid suit and is paying the expense of the defense of said suit, including the expenses connected with the preparation and filing of defendants' answer heretofore filed and will continue to pay the expenses of and control the further defense of said suit.

VIII.

That this Petition for Intervention is made with the consent of each of the defendants named in the aforesaid Bill of Complaint.

IX

Your Petitioner further states that in view of the foregoing it is directly interested in the result of this suit and would be irreparably injured and damaged by the grant of the prayer of plaintiff set forth in said Bill of Complaint herein.

X.

YOUR PETITIONER THEREFORE PRAYS that an order be entered making your Petitioner, County of Fresno, a body politic and corporate of the State of California, a party defendant herein, with leave to answer the Bill of Complaint herein nunc pro tunc as of the date when the answer of said defendants was filed, and ordering that said answer stand as the answer also of your Petitioner.

COUNTY OF FRESNO

By Chris Jorgensen,
Chairman of Board of Supervisors.

C. E. Beaumont,

District Attorney, County of Fresno

Ray C. Wakefield

Deputy District Attorney

Frederick S. Lyon,

Leonard S. Lyon,

Solicitors and Counsel for Petitioner.

STATE OF CALIFORNIA)
County of Fresno) ss:

Chris Jorgensen, being first duly sworn, deposes and says: That he is the Chairman of the Board of Supervisors of the County of Fresno, Petitioner above named; that he has read the foregoing Petition for

Leave to Intervene and knows the contents thereof, that the same is true to the best of his knowledge, information and belief.

Chris Jorgensen

Subscribed and sworn to before me this 11th day of April, 1921.

(Seal)

Ray C. Wakefield

Notary Public in and for
the County of Fresno,
State of California.

[Endorsed]: Received Copy 4/12/20 Paul S. Honberger Solicitor for Pff. FILED APR 12 1921 CHAS. N. WILLIAMS, Clerk By P W Kerr, Deputy Clerk

[TITLE OF COURT AND CAUSE.]

NOTICE.

To Warren Brothers Company, a Corporation, Plaintiff
above named, and to Paul S. Honberger, Esq., Its
Solicitor:

You, and each of you, will please take notice that the annexed petition that the testimony in chief of plaintiff's expert witnesses be set forth in affidavits, etc., will be brought on for hearing before Honorable Benjamin F. Bledsoe judge of the above entitled Court at the Postoffice Building, Los Angeles, California, at Ten O'Clock A. M. on April 18, 1921, or as soon thereafter as counsel can be heard.

Dated: Los Angeles, California, April 12, 1921.

Frederick S. Lyon.

Leonard S. Lyon.

Solicitors for Defendants.

[TITLE OF COURT AND CAUSE.]

PETITION THAT THE TESTIMONY IN CHIEF
OF PLAINTIFF'S EXPERT WITNESSES BE
SET FORTH IN AFFIDAVITS AND THAT
PLAINTIFF'S EXPERT WITNESSES BE
PRODUCED IN OPEN COURT AT THE
TRIAL FOR CROSS-EXAMINATION.

— — — — —

Come now defendants to the above entitled cause and, pursuant to Equity Rule 48, petition this Honorable Court that an order, be entered that the testimony in chief of any expert witnesses on behalf of plaintiff, whose testimony is directed to matters of opinion, be set forth in affidavits and filed within forty (40) days after this cause is at issue; and that each of plaintiff's said expert witnesses executing any such affidavit be produced for cross-examination upon the trial of this cause.

Frederick S. Lyon.

Leonard S. Lyon.

Solicitors for Defendants.

POINTS AND AUTHORITIES

Rule 48 of the New Equity Rules promulgated by the United States Supreme Court, October Term, 1912. *P. M. Co. v. Ajax Rail Anchor Co.*, 216 Fed. 634.

[Endorsed]: Received Copy 4/12/20 Paul S. Honberger, Solicitor for Pff. FILED APR. 12, 1921. CHAS. N. WILLIAMS, Clerk, By P W Kerr Deputy Clerk

[TITLE OF COURT AND CAUSE.]

ORDER ALLOWING INTERVENTION

The petition of COUNTY OF FRESNO, asking leave to intervene as a party defendant, having been duly filed herein, and the same being presented to the Court on April 18, 1921, and having been considered by the Court, it is hereby

ORDERED, that the said petition be and the same is hereby granted, and that the answer of defendants heretofore filed shall constitute and stand as the answer of said petitioner, and shall be considered as filed nunc pro tunc as of the date when the said answer was originally filed.

Dated: Los Angeles, California, April 19, 1921.

Bledsoe

UNITED STATES DISTRICT JUDGE.

FILED APR 22 1921. Chas. N. Williams Clerk.

By W. U. Handy, Deputy

[TITLE OF COURT AND CAUSE.]

ORDER THAT TESTIMONY OF EXPERT WITNESSES BE FILED IN AFFIDAVIT FORM

The petition of defendants that the testimony-in-chief of plaintiff's expert witnesses be set forth in affidavits, etc., having been duly filed herein and the same having been presented to the Court on April 18,

1921, and having been considered by the Court, it is hereby

ORDERED, that the testimony-in-chief of expert witnesses, whose testimony is directed to matters of opinion, be set forth in affidavits and filed as follows: those of the plaintiff within forty (40) days after the cause is at issue; those of the defendants within twenty (20) days after plaintiff's time has expired; and rebutting affidavits within fifteen (15) days after the expiration of the time for filing original affidavits.

Dated: Los Angeles, California, April 19, 1921.

Bledsoe

UNITED STATES DISTRICT JUDGE

FILED APR 22 1921 Chas. N. Williams, Clerk

By W. U. Handy, Deputy

[TITLE OF COURT AND CAUSE.]

NOTICE

To C. M. Thompson, O. M. Thompson, E. O. Thompson, co-partners doing business under the firm name and style of Thompson Brothers, H. E. Vogel and J. B. Hill, and the County of Fresno, State of California; and to Frederick S. Lyon, their solicitor:

You and each of you will please take notice that the annexed petition petitioning for an extension of time to *to* and including July 5, 1921, within which to file affidavits covering the testimony in chief of plaintiff's expert witnesses will be brought on for

[TITLE OF COURT AND CAUSE.]

DECREE.

On the 9th day of November, 1921. the above-entitled cause was taken under submission by the Court, and thereafter, on the 29th day of May, 1922, being a day in the January, A. D., 1922 Term of the District Court of the United States for the Southern District of California, Southern Division, the Court handed down its Opinion, and in accordance therewith, the above entitled cause was ordered dismissed;

NOW THEREFORE IT IS ORDERED, ADJUDGED AND DECREED that the above-entitled cause be, and the same hereby is dismissed, with costs in favor of defendant, taxed at \$121.70.

Los Angeles, California, June 1st, 1922.

Benjamin F. Bledsoe,
District Judge.

Decree entered and recorded June 1st, 1922.

Chas. N. Williams, Clerk.

By Douglas Van Dyke, Deputy Clerk.

Endorsed: Filed Jun 1, 1922 Chas. N. Williams,
Clerk; By Douglas Van Dyke, Deputy Clerk.

hearing before Hon. Benjamin F. Bledsoe, Judge of the above entitled Court at the Post Office Building, Los Angeles, California, at 10 o'clock A. M., on May 23rd, 1921, or as soon thereafter as counsel can be heard.

Dated at Los Angeles, California, May 17, 1921.

J. M. Head

Paul S. Honberger

Solicitors for Plaintiff

[TITLE OF COURT AND CAUSE.]

PETITION THAT AN EXTENSION OF TIME
IN WHICH TO FILE TESTIMONY IN
CHIEF OF PLAINTIFF'S EXPERT WIT-
NESSES BE GRANTED.

- - - -

Comes now the plaintiff in the above entitled cause, and petitions this Honorable Court that an order be entered extending the time heretofore granted on April 22, 1921, to *to* and including July 5, 1921, in which the testimony in chief of any expert witnesses on behalf of the plaintiff to be set forth in affidavits may be filed.

The plaintiff states that the time heretofore allowed under said order of April 22, 1921, has been and is insufficient within which to prepare and file the respective affidavits ordered under said order of April 22, 1921;

That the plaintiff's principal offices and the residences of plaintiff's witnesses are in Boston, Mass., or thereabouts; that the copy of the order of said Court of April 22, 1921, did not reach the offices of the plaintiff's solicitors in Boston until on or after May 1, 1921; that said cause was at issue about April 12, 1921, and that the time within which affidavits on behalf of plaintiff are required to be filed is forty days from said time; that defendants' answer requires careful consideration, said answer among other things cites sixty-eight United States Letters Patent, and seven British Letters Patent, as invalidating plaintiff's patent, all of which said respective patents require consideration on the part of plaintiff's witnesses and counsel.

Plaintiff has endeavored to comply with said order, but has not been able to do so within the time limited.

WHEREFORE, plaintiff prays for an order extending time to *to* and including July 5, 1921, in which the testimony in chief of expert witnesses, whose testimony is directed to matters of opinion, may be filed.

J. M. Head

Paul S. Honberger

Attorneys for Plaintiff

[Endorsed]: Received copy of the within May 17/21 Frederick S. Lyon Leonard S. Lyon for defendants FILED MAY 17 1921 CHAS. N. WILLIAMS, Clerk By P. W. Kerr Deputy Clerk

[TITLE OF COURT AND CAUSE.]

ORDER GRANTING EXTENSION

This cause coming on this day for hearing on Petition for extension of time to file affidavits of expert witnesses of plaintiff in testimony in chief; Paul S. Honberger, Esq., appearing as counsel for the plaintiff and F. S. Lyon, Esq., appearing as counsel for the defendant, and said counsel for the plaintiff, in support of said motion, having presented argument herein, and Leonard S. Lyon, Esq., in opposition thereto, also presents argument herein, and Paul S. Honberger, Esq., counsel for defendant having presented closing argument in support thereof, IT IS NOW BY THE COURT ORDERED: that the time within which to file affidavits of expert witnesses of plaintiff in testimony in chief be and the same hereby is extended eleven days.

[TITLE OF COURT AND CAUSE.]

STIPULATION

- - - -

IT IS STIPULATED that the affidavit of James W. Howard on behalf of the plaintiff may be filed in the above entitled cause, said affidavit being filed in accordance with an order of Court made herein April 22, 1921, and extension of time thereof granted;

AND IT IS FURTHER STIPULATED that the defendants may file their affidavits within 20 days

from the days of this stipulation, to wit, June 15, 1921.

J. M. Head

Paul S. Honberger

Solicitors for plaintiff

Frederick S. Lyon

Leonard S. Lyon

Solicitors for defendants

[Endorsed]: FILED JUN 17 1921 CHAS. N. WILLIAMS, Clerk By R S Zimmerman Deputy Clerk.

11-11a Affidavits for pltff Edwin C. Wallace Geo. H. Perkins (together with Exhibits A, B, C, D and E, attached to Perkins affidavit).

[TITLE OF COURT AND CAUSE.]

AFFIDAVIT.

Affiant, Edwin C. Wallace, being duly sworn, declares and says:

That for more than twenty-five years he has followed the profession of Chemist, that he is a member of the American Chemical Society; The American Society for Testing Materials and the Society of Chemical Industry of London, England; that for many years he has made a specialty of testing bitumens and bituminous pavements, etc., and that the following is a chronological recital of his experience in that line of work.

From 1891 to 1894, while a special student in Chemistry at the University of Cincinnati, he devoted his spare time to investigative and experimental work on asphalts and asphalt pavements under the supervision of Mr. Samuel Whinery, then General Manager of the Warren-Scharf Asphalt Paving Company with headquarters at Cincinnati.

In 1894 he regularly entered the employ of Warren-Scharf Asphalt Paving Company, assuming charge of the laboratory which had been built up during the previous years of experimental work. In 1897 he assumed charge of the laboratory of the Warren Chemical & Manufacturing Company established at their plant in Long Island City, N. Y., where they were engaged in the refining of asphalts, distillation of coal tar and the manufacture of roofing felts, mastic, and other bituminous products; this company being a subsidiary of the Warren-Scharf Asphalt Paving Company; the Cincinnati Laboratory of the latter company was abandoned.

In 1900 he became first assistant in the New York Testing Laboratory, then under the direction of Clifford Richardson, said New York Testing Laboratory being the technical department of the Asphalt Company of America (now General Asphalt Company) and having technical supervision of all pavements laid by that organization and their several subsidiary companies. During the two years he was connected with this laboratory he visited many cities in the discharge of his duties and had complete charge of all the work

during several months in 1900 and 1901 when Richardson was absent from the United States.

In March, 1902, he entered the employ of Warren Bros. Company of Boston as technical expert on bituminous mixtures and in the discharge of his duties visited all the plants engaged in laying the Bitulithic pavement throughout the United States of America and Canada with the exception of New England and the territory contiguous thereto over which the supervision was exercised directly by the Boston Office.

In 1907 he assumed technical direction of all work done by that Company and general control of the Laboratory, which connection lasted until 1909. In the spring of 1909, owing to ill health, he severed his connection with Warren Brothers and soon thereafter filed the application which eventuated in the patent in suit.

Affiant states that while the application for this patent was pending he made a thorough examination of United States patents pertaining to pavements, making notes thereon and familiarizing himself with the novel features of all the important patents and he states that he has examined the list of patents offered by the defendants in this case as anticipations of the patent in suit, and states he has records of and is familiar with all but five of the patents cited, and of these five two were issued from six to eight months after the effective date of the patent in suit, and that the other three have been examined and found to have no reference or connection whatsoever with bituminous

pavements or their construction; one of them referring to the construction of floors suitable for skating rinks made of Portland cement concrete, another referring to the construction of roofs composed of bituminous materials combined with coke or cork or other lightweight body materials, while the third was for a method of heating the mineral aggregate for use in bituminous concrete, which method is substantially identical with that used by Warren Brothers Company since the very inception of their business. Affiant states that no single patent cited by defendants nor any collection of them either anticipates or discloses the invention covered by the patent in suit, that of the numerous patents cited in this record many of them have not the slightest resemblance to the present construction, and that they must have been cited merely for the purpose of making a formidable appearing list of references and the most cursory examination would have shown them to be irrelevant, and that the few which might be construed as having some bearing on the present case were cited by the Primary examiner during the prosecution of this case in the patent office, which application was finally allowed and the patent finally issued for a new and useful invention for the construction of a street pavement.

Composition or bituminous pavements derive their name from the bituminous composition used for cementing together the particles of mineral matter which forms the body of the pavement. There is no bond of union between the pieces or particles of the mineral matter other than that formed by the bituminous

cement; which constitutes less than $1/8$ of the mass of the pavement. A pavement of this kind may be said to consist of two distinct elements, possessing entirely different physical properties, one being the mineral or weight bearing element and the other the adhesive cementing or bonding element. From the earliest days it has been recognized that the chief problem by which the industry was confronted was how to use sufficient bituminous composition to effectively bind the mineral particles together, render the mass impervious to moisture, and still have sufficient stability to prevent the deformation or distortion of the surface caused by traffic, generally referred to as ridging, rolling, shifting or shoving. To obtain this desirable result various devices have been tried, chemicals have been used and combinations of all sorts have been made.

The term pavement is a broad one. Originally applied to floors beaten down so as to become hard, it has come into general use for any kind of a substantially rigid level surface which can be used for foot or vehicular traffic. Pavements have been constructed of plates or iron, blocks of wood, brick and stone, while composition pavements have been constructed in both block and sheet form.

The term is still further complicated by the fact that it is sometimes used to designate the entire structure, including the foundation and supporting layers while at other times it refers merely to the wearing surface. This applies particularly to composition pavements as in this construction the supporting layers bear an important part. The fact has long been recognized that

compositions satisfactory as foundations or supporting layers were not always satisfactory as wearing surfaces, for the chief requirement of the foundation layer was capacity to withstand heavy compression and shearing strains (rigidity) while the wearing section in addition to compression, etc., is also subjected to attrition and impact, as well as being exposed to the action of the elements. It is conceivable that a rigid body might successfully withstand great compression and shearing strains but unless it was also tough and tenacious it might fail under impact and attrition.

Each fragment, piece, grain or particle of mineral matter, regardless of its size, any detached portion, may be considered as a unit. The smallest particle of dust is a unit just as much as the largest piece or fragment of stone or grain of sand or gravel. A mass of impalpable powder is merely a collection of extremely small units. However small these individual units may be they are each and every one an aggregation of an immense number of molecules united by the force of cohesion. If a large number of very small units of mineral matter were cemented together by some adhesive material equal in strength to the force of cohesion which binds the molecules together the result would be a body equal in strength to a solid body of the same mineral matter, but where the adhesive cement is not equal in strength to the force of cohesion the result would be a body having less strength than a solid body of the mineral matter, and the greater the difference in strength between the adhesive cement and the cohesive force the greater would be

the difference in the strength of the bodies. Similar results would obtain if the strength of the adhesive cement varied under different conditions. With bituminous cement that is precisely the condition which exists. The adhesive or bonding strength of bituminous cements varies greatly with the temperature. As an illustration of how the strength of bituminous cement varies with the temperature the following results may be cited. Two brass discs having slightly concaved surfaces and an area of two square inches were cemented together with ordinary paving cement made with Trinidad asphalt; At 50° F these discs, in tension would sustain a load from 600 to 650 pounds before breaking apart. At 80° F this load was reduced to between 75 to 90 pounds and at 90° F no test could be made with the apparatus used as the discs pulled apart as soon as the load was applied.

When the cement was made harder to sustain loads at the higher temperature it was found that it was affected more by impact and attrition.

It can be shown that these cements are affected most by attrition and impact at the temperatures at which they sustain the greatest load under tension.

Equal volumes of mineral matter composed of large or small particles may contain the same amount or mass of mineral matter, but the surface area of the particles which has to be covered with cement in order to bond the particles together is much greater with the fine than with the coarse material.

In order to coat all the surface of all the particles it would therefore require more adhesive cement with fine than with coarse mineral matter.

In a pavement the foundation or supporting layers are protected from impact and the chief requirement is the power to resist displacement under heavy loads. It has long been recognized in the paving art that a mass of large stones not bonded together possesses a greater degree of rigidity than a mass of smaller stones because of the greater inertia of the large mineral units, and where rigidity is the chief requirement, it is quite natural that large stone should be used. In the foundations of all structures where conditions will permit, it is the custom to use large units of stone, and it is best to use the largest units of stone that the dimensions of the construction will permit.

In road building it has long been the custom to place the largest stones in the lowest layers. When composition pavements first came into general use, the cost of hydraulic cement was such that it was not so generally adopted for foundations as in present day construction and recourse was had to a multiplicity of layers of stone or composition superimposed one on the other.

Where layers of composition were used as supporting layers they were generally composed of an indiscriminate mixture of coarse and fine mineral units. Several layers were frequently used and it was the general custom to use the coarse material in the lower layers, each successive layer being composed of finer material. Many patents were issued for methods and products, long since abandoned, which in the light of present day practice appear absurd, but through them all it is evident that certain qualities or properties have

been considered essential. When concrete came into general use and the use of bitumen derived from coal tar as cementing agent was supplanted by asphalt, natural or derived from petroleum, the construction now known as "asphalt pavement," was gradually developed. Many defects developed in the earlier constructions and the causes to which they were ascribed and the reasons given therefor were as various as the methods adopted for their correction.

It was generally conceded that a successful pavement should have sufficient resistance to compression and shearing strain to withstand heavy loads, that it should also have a certain degree of plasticity in order to withstand the impact and attrition of traffic, that it should be substantially impervious to moisture and that its susceptibility to changes of temperature should be reduced to a minimum.

Of the many patents taken out a few may be regarded as typical of the methods of construction. The patents to Scharf, Bailey, Parisen, Averill, DeSmedt and Barber refer to foundation and intermediate layers as well as wearing surface, while patents to Richardson, Warren, Whinery and Malette refer more specifically to wearing surfaces.

Other patents have been issued along these lines, differing in details, but this list is fairly representative and the patents cited are the most important.

In all cases the wearing layer is the only layer exposed to the action of traffic, the other layers being merely supports for the wearing surface. These supports in some cases were built as a single layer, in

others as a plurality of layers superimposed. It is noticeable that with all the different kinds of foundation and variation in number and thickness of the supporting layers, the wearing surface has always been regarded as a thing apart, an entity, separate and complete. The thickness of the supporting layers varies from one inch to one foot, but the thickness of the wearing surface has practically been confined to within the narrow limits of $1\frac{1}{2}$ to 3 inches.

Many different bituminous compositions have been used in both supporting and wearing layers and mineral aggregates of many kinds and sizes have been used, but the wearing layer has always differed in some respect from the underlying layers. When composed of similar materials something has always been added to or omitted from the composition of the wearing layer and apparently it was always considered necessary that it should be of substantially uniform composition throughout its thickness. That results have not been altogether satisfactory is evidenced by the number of patents issued to remedy defects and that there was also a wide divergence of opinion as to the best method of accomplishing that result is evidenced by the variety of methods as expressed in the patents.

Averill's patent No. 211,313 provided that the layers should be unattached so as to move freely on each other. Eight years later the DeSmedt patent No. 375,273 was granted, claiming that greater strength was imparted to the wearing layer by interposing a layer of "binder" between the concrete and the wearing layer and causing the two layers, binder and wearing

surface, to adhere. This is diametrically opposed to Averill's idea. The Barber patent No. 391,222 considers it still better to cause three layers to adhere and therefore substitutes for DeSmedt's concrete a layer of bitumen coated stone. The wearing layer in all these cases was substantially the same, a fine mineral aggregate, sand, combined with a bituminous cement composed of Trinidad asphalt softened with petroleum residuum. Each of them, Averill, DeSmedt, Barber, all men versed in the art, tried to improve the wearing surface by changes made in the underlying supporting layers. Scharf, Bailey and Parisen also show the greatest variations in their underlying supporting layers but even in this respect Bailey and Parisen are much alike but Parisen's idea seems to be more in accord with DeSmedt's than Averill's since he tried to insure bonding the layers together by sprinkling each of them, after compression, with the same bitumen used in the construction. Any one of the layers of Scharf, Bailey, and Parisen could have been substituted for any one of the layers described by the others and practically the same results obtained, since each layer was complete in itself and substitution of one layer for another would not have affected contiguous layers in the slightest degree.

In 1898 Clifford Richardson obtained a patent, No. 697,884, in which an attempt was made to regulate the proportion of various sized units of the mineral aggregate and by this regulation control, within certain limits, the amount of bituminous cement required to coat the particles.

Richardson directed his development entirely to the wearing surface, assuming that the problem so far as underlying layers were concerned was solved.

Richardson was an advocate of fine mineral aggregates and in this patent the largest units passed a screen of 10 meshes per linear inch.

Richardson laid his wearing surface two inches thick and uniform throughout its depth.

In the construction of wearing surfaces use has been made of coarse aggregates and fine aggregates, but whatever the nature of the aggregate or the kind of bituminous cement used special efforts appear to have been made to have them uniform throughout the layer and wherever the thickness has been specified it falls within the limits of $1\frac{1}{2}$ " to 3".

Warren, Whinery and Malette, the more recent advocates of the use of coarse rather than fine mineral aggregates also produce wearing surfaces substantially uniform throughout. Malette does spread some fine mixture over the top of his wearing surface composed of coarse aggregate after it has been thoroughly compressed but states specifically that it is NOT AN ESSENTIAL feature of his invention but is merely resorted to to give a finish (temporarily), and in an alternative which he described he omits the fine mixture entirely and uses a finishing layer of limestone screenings or fine gravel without any coating of pitch or bitumen.

In practice, whenever coarse aggregate has been used it has been found necessary to paint the top of the wearing layer with more or less liquid bitumen in

order to seal the top of the surface and render it impervious to moisture.

Prior to 1901 coarse aggregates for bituminous wearing surfaces had seldom, if ever, been used successfully.

In 1901 patents were issued to Warren, Whinery and Malette for construction of bituminous wearing surfaces in which coarse mineral aggregate was used.

The only thing in common in the patents issued to these three different persons was the use of coarse aggregate for the wearing surface.

Both Mr. Warren and Mr. Whinery had had years of experience in the construction of "asphalt pavements," each had recognized that there was something lacking in that method of construction and each had turned to the use of coarse stone in the wearing surface to correct what they considered defective construction. In the course of the next few years other patents along similar lines were issued to Warren, and one in particular, No. 727505, has been finally adjudged to be a valid patent after protracted litigation as to its novelty and utility.

Prior to the Warren patent, broken stone or gravel had been used mixed with fine mineral matter or sand for the construction of bituminous wearing surfaces, but no attempt had been made to grade and recombine the different sized particles in predetermined proportions. Warren adopted the method of determining the sizes of the particles within certain limits and then combining the coarse with the fine in proportions best adapted to secure a certain result which he termed

"inherent stability". He had determined by experiment that by mixing the coarse and fine aggregates of the material to be used in proportions varying according to the sizes of the respective materials, mixtures could be made in which the voids were greatly reduced and stability greatly increased. His idea was to use the largest possible amount of coarse material with fine material merely sufficient to reduce the voids to a minimum, this aggregate then to be combined with bituminous cement and laid and compressed in the usual manner.

In practice, however, it was soon found that the maximum of coarse material as indicated by the void test did not give the best result, owing to the tendency of the coarse particles to crush under traffic and a decided modification had to be made; the resulting mixture, however, still came within the scope of the Warren patent as the voids were unquestionably low and the mixture stable.

The stress and strain to which a composition pavement is subjected is not uniform throughout the thickness of the layer, but varies both in kind and intensity at different depths of the layer.

These might be roughly defined as general strain to which a section would be subjected throughout its depth, as compression, and special strain such as impact which acts directly upon the superficial area of the layer.

Examinations of samples of bituminous pavements which have been subjected to traffic show conclusively that in the superficial area of the wearing surface, sub-

jected directly to the impact of traffic the mineral matter is crushed and reduced to a finer state of subdivision than the mineral matter in the lower portion of the layer, although at the time of laying the same material had been used throughout. The coarser the grains of the mineral matter used the greater the relative reduction in size and consequent increase in the number of detached grains or particles of mineral matter.

The only bond of union between the units of mineral matter is that afforded by the bituminous cementing medium and the amount of that medium which can be used is controlled by the size of the units, the larger the units the smaller the proportion of the cementing medium; this cement merely coats the surface of the mineral units and does not penetrate into the body thereof.

It follows therefore that when the units are broken, surfaces which are not coated by the cementing medium are exposed, at least two uncoated surfaces for each fracture of a grain or particle. These uncoated surfaces are a source of weakness, and the degree of weakness depends entirely on the composition of the layer. If the mineral units are small and the proportion of cementing medium sufficient, under the kneading action of traffic, these surfaces may become re-coated with the cementing medium; but where the mineral units are large the proportion of the cementing medium is less and the greater inertia of the units offers greater resistance to the kneading action of traffic so that the dry surfaces are not so likely to

become coated by the cementing medium; these dry surfaces permit the ready absorption of moisture and disastrous results usually follow.

The tendency of loads moving over the surface of a pavement is to push the wearing surface ahead of the load, while the foundation on which the layer is supported tends to maintain the layer in a state of rest. These counterforces cause a stress and strain to be set up within the mass of the layer and cause the separate units of mineral matter to move, one on the other if not evenly supported on all sides.

Warren recognized this and attempted to correct it by producing a mineral aggregate which was firm in itself, by reducing the voids in the aggregate to the lowest practical degree.

Warren's idea was a step in the right direction, but the volume of voids can not be controlled solely by regulating the quantity of each of the various sizes of units which compose the aggregate. The juxtaposition of the units is also an important factor. No control could be exercised under the Warren patent.

The key note is the relative position of the units, and that can not be controlled by making a promiscuous mixture of large and small units from top to bottom of the wearing surface, even though the number of units of various sizes be limited.

Warren was chiefly concerned with the composition of his wearing surface, practically all his efforts being centered on the sizing and proportioning of the particles, or units, of the mineral aggregate employed, and this was the same throughout the layer, or as

Warren says in patent No. 727505 "the grades being thoroughly mixed and thereby being properly distributed throughout the mass."

In the patent in suit the chief concern does not lie with the composition of the wearing surface nor with the composition of the mixtures used in the formative process, but lies chiefly with the structure of the completed wearing surface as produced, irrespective of the actual composition of the material used.

The novelty and utility of this method of construction is beyond question and wherever it has been tried in comparison with other forms of construction has always proven its worth, frequently to the exclusion of older and more widely known methods of construction.

One of the unusual and novel features of this method of construction, necessary to produce the desired result and one which at the outset was considered highly objectionable is the necessity of handling the two kinds of mixture (coarse & fine) substantially concurrently.

It is well known that in the practice of constructing a pavement built up of layers of mixtures of different composition, it is the custom to lay one layer at a time, frequently for several days, then to change to another mixture for the next layer. In the method, covered by the patent in suit, however, it is necessary to follow up the coarse mixture with the fine before the former has become cold in order to secure the proper compression on the coarse mixture and also assure the desired blending and bonding of the two

mixtures into a single non-cleavable layer. If this blending and bonding is not secured and the fine mixture does not become an integral part of the coarser layer, it scales off or wears away or becomes distorted within a few weeks or months according to traffic conditions.

Where the two mixtures have been properly blended and bonded together and the fine mixture becomes an integral part of the pavement, it has lasted for years under traffic conditions which have fully demonstrated its improvement over other methods of construction.

By the preferred method of construction pointed out by the patent in suit the large mineral units of the lower layer are neither in close contact nor in fixed position relative to each other when the fine mixture is spread over the top, but are disposed loosely on the foundation. The pressure which brings the large units into close contact and bonds them together acts first on the fine mixture and tends to force it into the interstices of the upper portion of the layer of coarse mixture and at the same time it consolidates said layer by causing a change in the relative position of the particles of which it is composed.

The two mixtures are thus caused to blend and become bonded together without joint, or cleavage-like plane of union, and can not be separated into their original parts. Since the force which causes the fine mixture to blend with the coarse is the identical force which brings the units of the lower layer into close relation and into fixed position relative to each other, the interaction is such that stable equilibrium is estab-

lished. The large mineral units at the top of the layer of coarse mixture are thus firmly wedged into position and effectively supported on every side, instead of being merely seated on underlying particles without proper lateral support.

This lateral support acts as a preventive of the rolling or rocking of the large units upon each other, or upon the matrix of fine mixture, and it may be likened to the construction of an ordinary arch of masonry, where by means of wedge shaped blocks and a keystone vertical stress is so resolved into transverse stress that the load is supported by piers at the side but not directly under the load. By having the large units supported laterally, a stress which would tend to move a unit in a vertical direction would have less effect on that unit than it would if such support were lacking. If the resistance at all points were equal to the stress, it is obvious that the unit would remain at rest, but if, in any direction, the resistance does not equal the stress obviously the unit would move in the line of least resistance and a rocking or rolling motion would be imparted to units which are not supported laterally as well as vertically.

Warren, Whinery and Malette, the three latest advocates of the use of coarse mineral aggregates for wearing surfaces of composition pavements, were in accord in the idea that with such aggregates "the stone takes the wear."

When reduced to practice it was soon found that this was true, literally true; the stone took the wear to an extent which was surprising and the pavements

were often much the worse for it within a very short period of time. Malette realized this and within four months from the date of his first patent had obtained a second one in an effort to correct the defects of the first. Warren also found it necessary to modify his construction by increasing the proportion of fine material above that indicated by the void test as giving the lowest percentage of voids. The difference between the lowest possible and the lowest practicable percentage of voids was one which often called for great nicety of decision.

In the patent in suit "the stone bears the load," as it is well suited to do, but it is protected from "wear" by a relatively thin coat of impact-resisting mixture, which is in turn protected from deformation or displacement by the "load-bearing stone." By discarding uniformity of composition throughout the entire mass for adaptability to resistance to stress, a wearing surface is produced which is stable where stability is most needed, but plastic where plasticity is more desirable.

This impact-resisting coat serves the double purpose of protecting the stone from abrasion, and also renders the surface substantially impervious to moisture. The product produced by this method of construction is complete within itself with maximum resistance to the effect of traffic and to the action of the elements as well.

Warren found by experience he had to provide some means of rendering the superficial area of the wearing surface produced by his process less pervious to moisture; he therefore painted the surface with a liquid

bituminous composition afterwards spreading stone chips over the paint. The necessity of applying the liquid paint composition shows that the Warren product, which theoretically was correct in principle, was not practically "complete in itself" but required an additional step in the process of construction.

This paint method of sealing the surface was a return to the practice of earlier days, and was soon found to be a source of annoyance and often of considerable expense, as no practical method was ever found by which it could be kept under reasonable control.

In practice under the Warren patent the effort was made to provide a malleable fine bituminous surfacing by using a surplus of the fine ingredients and bitumen with the coarse aggregate comprising the wearing section and depending upon compression to bring this surplus fine aggregate and bitumen to the surface. This was partly accomplished but at the expense of detracting from the stability of the entire structure because it left a surplus of the bituminous mortar element throughout the structure. Under the patent in suit the extremely desirable malleable surface is accomplished and at the same time the stability of the structure retained.

Construction under the patent in suit does not produce a multi-layer pavement, but a combination of two dissimilar mixtures into a single layer with a merging of coarse into fine or fine into coarse, viewed from the bottom up or the top down. A sectional view could not be represented by two parallelograms with one side common to both, as neither the base line of the

fine aggregate topping mixture nor the top line of the coarse aggregate body mixture, could be represented by a straight line, but rather by one which is irregular, sinuous and deeply indented. A structure is thus produced composed of elements, each of which is best adapted to the purpose for which it is intended. The load-bearing element containing large mineral units, which impart stability, is used only where stability is the essential feature, while the impact-resisting element is composed of small mineral units as being best adapted to resist abrasion by its pliability. By blending these two elements together the change from stability to pliability is more gradual than could otherwise be obtained. It is doubtful if any two sections could be made through this structure, in any direction, which would show the same composition or the same relative proportions of the two mixtures.

In a multilayer pavement there is a plurality of layers of composition; each layer, while it may differ from contiguous layers, is substantially uniform throughout. A section through any one of the layers, through any part thereof, or in any direction would show it to be substantially uniform as to both composition and thickness. Each of the layers being of uniform composition would possess the same characteristics or properties throughout, and the superimposed layers might be likened to a number of boards glued together. The boards might vary in thickness and be made from various woods but there would be no blending of parts such as occurs when two pieces of metal are welded together.

The difference between composition and structure may be shown by the well known type of road known as macadam, which is a structure and not a composition, as it is not uniform throughout the thickness of the wearing layer.

In this construction a layer of stone is placed upon a previously prepared base and fine material forced in from the top by the kneading action of a roller, so as to secure lateral support for the stone forming the body of the roadway. In this way a firm and substantial structure is produced without recourse to adhesive cements. The same results could not be obtained by mixing coarse and fine aggregate indiscriminately and then placing a layer of identical thickness upon the same base and compressing it with the same roller. No matter how carefully the proportions of coarse and fine material were determined the results would not be the same.

The excellent results obtained with the ordinary macadam roadway has caused many paving experts to attempt to reproduce it with the addition of an adhesive cementing medium like bituminous cement. Unfortunately this has generally been done without taking into consideration the change wrought by the addition of such adhesive material.

In plain or so-called waterbound macadam it is necessary to compress the layer of stone forming the body of the roadway before applying the fine material, as otherwise the fine material works through the mass to the bottom of the layer of coarse stone, with unsatisfactory results.

Furthermore, the water applied during the later compression, is a mobile liquid which readily permeates the mass, carrying with it the finer particles of dust into the smallest of the interstices and since the stone wears more by attrition when watersoaked some of the extremely fine dust is doubtless formed "in situ" and acts to wedge the stone in place.

All this is changed, however, when bituminous cement is used, since its viscous adhesive nature prevents the very action on which the success of the process so largely depends. Efforts to use bituminous material in this way have usually resulted in the production of multi-layer pavements with most of the layers lacking in stability. Except under extremely light traffic conditions, results have never been satisfactory.

In the patent in suit this difficulty has been overcome by producing a wearing surface consisting of a single layer, one and inseparable, a structure with the different sizes of the mineral aggregate placed where they are most needed rather than a mere compound.

To adapt various parts of the structure to resist the particular stresses to which they would be subjected seemed to be more logical than to make predominant any one quality at the expense of others equally necessary.

This can be accomplished by following the process covered by the patent in suit.

The large mineral units of the body of the layer impart stability thereto while fine material units, which are less injuriously affected by impact, are used to ad-

vantage in that portion subjected to the direct action of traffic.

It is the blending, the welding, the amalgamation into a compact integral mass, which permits the use of a plastic fine mixture made so rich in bituminous content as to best accomplish the result, and also permits the reduction of the thickness of that portion of the layer so that stress and strain are both minimized by the gradually increasing stability of the mass from the top downward, thus accomplishing an important result which could not be accomplished with any previous construction.

Affiant states that he has carefully compared the specifications entitled "Asphalt Concrete A" under which the pavement constructed by defendants was laid with the specifications and claims of the patent in suit and also what purported to be a sample of the pavement actually laid by defendant and in his opinion the specifications require the construction of a pavement which will infringe the claims of the patent, and the examination made of the samples submitted to him prove that the process pointed out by the patent to produce that product must have been substantially complied with.

Edwin C. Wallace.

Subscribed and sworn to before me this 26th day of May, 1921.

(Seal)

Robert Fowler,
Notary Public.

Commission Expires March 7, 1924. ROBERT FOWLER, Notary Public.

Endorsed: Received copy of within this 2d day of June, 1921 Frederick S. Lyon Leonard S Lyon Sol. for Defs.

FILED JUN 3 1921 CHAS. N. WILLIAMS,
Clerk, By P W Kerr Deputy Clerk

[TITLE OF COURT AND CAUSE.]

AFFIDAVIT.

Affiant, George H. Perkins, states that he attended school at Rugby Academy in Philadelphia preparatory to entering college and graduated therefrom in 1891. He subsequently took a five year scientific course at the University of Pennsylvania, and received the Degree of B. S. in Engineering in 1895, the Degree of Mechanical Engineer in 1896; that he was subsequently employed by the Warren Scharf Asphalt Paving Company in 1897; was paving plant foreman during the years 1897 and 1898; superintendent of the Warren Scharf Asphalt Refinery in 1899; subsequently became plant foreman of the Barber Asphalt Paving Company, from 1899 to 1901; that he became superintendent of coal tar refinery for Warren Brothers Company February, 1902; and afterwards superintendent of street work in the fall of 1902, and superintendent of refineries from 1903 to 1919. He was in charge of the laboratory of Warren Brothers Company from 1907 to 1908, and also of laboratory inspection from 1909 to 1921, has had actual experience in the detailed construction of both plant and street work, and sheet asphalt, asphaltic concrete, and Warrenite-Bitulithic

pavement. That it has been a part of his duties for the past fifteen years to study paving specifications as adopted by the different municipalities throughout the country, and especially in their application to the specifications and claims of patents issued for the various kinds of street pavement.

Affiant further states that the most obvious division of street pavements is in Monolithic or street construction and block pavements.

That the United States government has issued more than a hundred patents covering the different kinds of sheet pavement, the materials of which they are composed, and the method of their construction, and almost as many for the different kinds of block pavement.

Affiant further states that prior to 1901 the construction known as standard sheet asphalt pavement was considered the best smooth pavement for city streets, and its reputation was well deserved.

For country roads, water bound macadam was considered the standard of excellence as it was peculiarly well adapted for the horse drawn, iron tired vehicles, exclusively in use at that time.

The physical characteristics of these two constructions are diametrically opposite due to the characteristics of the materials composing their respective wearing surfaces.

The sheet asphalt pavement consisted of:—

(a) A foundation layer of sufficient compressive strength to sustain the weight of traffic.

(b) A layer of “asphaltic binder” composed of

$\frac{3}{4}$ " crushed stone, mechanically mixed while hot with sufficient hot asphalt cement to coat each particle of stone. This binder was spread while hot on the foundation and compressed to a thickness of one (1) inch.

(c) The wearing surface consisted of sand, finely pulverized limestone dust and asphalt cement, all mechanically mixed while hot in a paving plant, then hauled to street and spread while hot on the previously compressed asphaltic binder to such a depth that when compressed by rollers it was two (2) inches thick. During the final rolling the surface was swept with dry Portland cement, and when pavement had chilled to air temperature it was open to traffic.

(d) In 1901 it was standard practice to always lay the fine aggregate wearing surface to twice the thickness of the asphaltic binder course, that is

Asphaltic Binder Course	1"	thick	after	compression
Sheet Asphalt Wearing				
Surface	2"	"	"	"

The above practice was considered standard for many years, and is still in use in many places.

About five years ago, some cities experimented on light traffic streets, making the two courses of equal thickness, that is one and one half ($1\frac{1}{2}$) inches each. This modification being successful on light traffic streets, it was later very largely adopted for standard construction on heavy traffic streets. However, up to the present time, the fine aggregate wearing surface is never laid to a less thickness than that of the binder course.

(See exhibit A.)

The water bound Macadam was laid by an entirely different method as follows:

(a) The road bed was first drained of water.

(b) Large crushed stone was then spread and rolled to whatever thickness was deemed required by the anticipated traffic.

(c) Another layer of crushed stone consisting of particles approximately 2" to 3" in size was then spread 4" or more in depth and rolled.

(d) Fine crushed stone, was then spread over the above coarse stone and rolled until this fine stone had sifted down into the voids or air spaces between the coarser stones. After more fine crusher screenings were spread, the road was thoroughly wet or "puddled" by means of a sprinkling cart and rolled again until the fine wet screenings would appear as a wave in front of the roller wheels. The road after being allowed to dry was thrown open to traffic.

From the above description it is obvious that the two wearing surfaces differed in the following important particulars:

(a) The sheet asphalt surface consisted of relatively small particles of sand (all of which were $\frac{1}{8}$ " or smaller diameter) bound together by an asphaltic cement.

(b) The macadam surface, consisted of large, medium and small sized particles of stone, compacted together so that they interlocked and formed a stable structure.

The physical characteristics of the two wearing surfaces naturally corresponded to the characteristics of their ingredients as follows:

1—Sheet Asphalt Surface.

(a) Stability. As the grains of sand composing the mineral aggregate could not interlock to any appreciable extent, the stability or resistance to displacement varied in direct proportion with the hardness and the cementing strength of the asphalt cement used to bind the particles of sand together.

As the hardness of the asphalt cement varied with its temperature, so the stability of the sheet asphalt wearing surface also varied inversely as the temperature, that is the wearing surface was hard and stable in winter, but relatively soft, plastic and unstable in hot summers.

(b) Toughness, Resistance to Abrasion. This quality also varied directly with the cementing strength of and the amount of asphalt cement used in the surface mixture. It also varied inversely as the hardness of the asphalt cement.

The greater the amount of the asphalt cement used, the greater the toughness and resistance to abrasion; however, if an excessive amount were used it made the mixture so plastic, it would push, shove, and roll under traffic.

(See exhibit B.)

This tendency could be partly overcome by using a relatively hard asphalt cement; however, there was also a limit to this procedure, as if too hard

an asphalt cement were used, it became so hard and brittle at low winter temperatures as to make the surface friable, crumbly and thus non resistant to abrasion of traffic.

On account of the above it became distinctly an engineering problem to decide in advance, just what hardness and amount of asphalt was appropriate for each specific surface mixture, to meet the climatic and traffic conditions.

When the proper amount and hardness of asphalt cement was used, then under the wear and tear of traffic the surface would abrade fairly uniformly, the abraded or displaced material consisting of fine grains of sand.

2—Water Bound Macadam.

(a) Stability. Due to the interlocking of the large, medium and fine sized particles this construction was always stable. It could not be plastic. Its stability was not affected by temperature.

(b) Toughness, Resistance to Abrasion. Like all non-bituminous wearing surfaces, it was subject to abrasion as soon as thrown open to traffic. Iron tires of vehicles, pulverized the crusher screenings to a fine dust and if this were wet by rain or by artificial means, this fine dust would form a weak cement to bind the coarser particles of stone together at the surface.

Therefore up to a certain amount, traffic really assisted in keeping the road in good condition.

Whenever this dust formed by traffic was allowed to be blown away before being wet down

and recemented into the surface, then the larger stones in the surface rapidly became loosened by traffic.

As each large stone provided lateral support for other adjacent particles, naturally as soon as one stone became dislodged, the adjacent stones became loose and a "chuck hole" would rapidly form.

(see Exhibit C.)

In 1901 the late Fred J. Warren, who was thoroughly experienced in the laying of sheet asphalt pavements, applied for a patent later issued as No. 727505. In this invention he endeavored to combine the merits of sheet asphalt and of water bound macadam and avoid the defects inherent in each.

Warren's experiments proved:—

(1) That in a box (or any other vessel) filled to the brim with particles, each of which was the same size and shape as each other particle, the combined volume of the voids or air spaces between said particles amounted to forty four (44) percent of the volume of the box.

(2) That this was true, irrespective of the diameter of the individual particles, that is, this was just as true if each of the particles was $1/1000$ inch diameter, as if they were several inches in diameter. In the former case there was an exceedingly large number of exceedingly small voids, in the latter case a relatively small number of relatively large voids. The total combined volume of voids was the same in either case.

(3) That by mixing together large and small particles, this percentage of voids could be greatly reduced.

(4) That by using sand and pulverized dust as in sheet asphalt surface mixtures, the voids could be reduced to approximately twenty-five (25) percent of the total volume of the aggregate, but could not be reduced below that amount.

(5) That by using particles of stone, sand and dust varying in size from $1\frac{1}{2}$ " or larger diameter down to impalpable powder the voids could be reduced to less than twenty-one (21) per cent of the total volume of the aggregate. In many cases to 12—15 per cent.

(6) That the extent to which the voids were reduced depended upon the proportion or amount of each size particles used, and that it was practicable by laboratory tests of the material to be used to determine in advance the proportions of each size needed to reduce the voids substantially to a minimum.

(7) That the use of particles thus graduated in size, gave the aggregate a useful degree of inherent stability, due to the interlocking of the coarser particles by the smaller sized particles.

(8) That when using sand and fine dust as used in sheet asphalt mixtures it was impossible to cause sufficient interlocking between the particles to produce any useful degree of inherent stability.

In the practical working out of his invention Warren found it best practice to use as a maximum size stone,

one whose diameter was approximately one-half ($\frac{1}{2}$) the thickness or depth of the wearing surface layer, and as it was customary to lay the wearing surface two (2) inches thick after compression, this gave a maximum size stone of about one and one-fourth ($1\frac{1}{4}$) inch diameter.

Crushed stone from this size, to that of impalpable powder, and sand were heated and the proper proportions of each size then mixed with sufficient asphaltic cement to thoroughly coat each particle of the aggregate and to fill the few remaining voids in the aggregate. This mixture while still hot was conveyed to the street, spread upon the prepared foundation to such a depth that after thorough compression by a heavy roller it was two (2) inches thick.

By this method of using the proper predetermined proportions of each size of aggregate and amount of asphaltic cement and by the thorough mixing of same, Warren was able to produce a true bituminous concrete so that when compressed upon the foundation the wearing surface layer was uniform in composition throughout its entire depth.

That is the coarse, medium and fine sized particles were indiscriminately and uniformly distributed throughout the depth of the layer in order to produce uniform density and uniform stability at all points throughout the mass of the wearing surface. (See exhibit D)

When this mixture was laid as described above and after it had been compressed as much as possible, it was found advisable to thoroughly seal the surface,

with a thin coat of hot bituminous cement, applied by means of rubber squeegees, and in order to prevent this bituminous cement from adhering to wheels of vehicles, it was immediately covered with a coating of fine stone chips which were rolled into the surface film of bituminous cement. This treatment was and is known as "flushcoat" or "squeegee coat."

If the relative amounts of coarse, medium and fine sized particles used, have been those which will give the greatest density or minimum of voids in the mineral aggregate, then when the mixture has received ultimate compression, the bituminous mortar will be flush with the tops of the uppermost coarse stones in the mixture, but will not cover the tops of said stones; therefore, while the mortar, in that case, does fill the spaces between the sides of such coarse particles and thus tends to hold them in position it does not in any manner protect them from the impact and abrasion by traffic. In other words, the product is strictly in accordance with Warren's idea of making "the stone take the wear."

It was early recognized that if the mixture contained a considerable amount of this fine aggregate bituminous mortar in excess of that required to fill the voids between the larger particles, then during the rolling of the hot mixture, more or less of the excess mortar would rise to the surface of the pavement and to a small extent cover over and thus protect the tops of the uppermost stones.

As the amount of this excess mortar needed was dependent upon both climatic and traffic conditions,

naturally the amount required could not be determined by laboratory tests and it became a question of judgment on the part of the person who finally decided what proportions of each size aggregate and amount of bituminous cement were to be used for each particular street. If he estimated conditions correctly, the pavement was a success. If he underestimated the amount of mortar needed, the pavement would ravel. If he overestimated the amount of mortar needed, then this excess of mortar would not all be brought to the surface of the pavement and consequently there would be left down in the center of the body of the pavement, more mortar than was needed to fill the voids between the coarser particles, and this extra mortar in that position would keep the larger particles separated to such an extent that they could not properly interlock among themselves and provide the desired inherent stability. Therefore, in such cases the pavement would frequently shift and shove under traffic in warm weather.

This necessity of compromising the stability of the pavement in order to increase its resistance to abrasion was most unsatisfactory, and many expedients were suggested and tried.

One expedient suggested was to design the mixture on the lines laid down by Warren, that is use those proportions of ingredients which by laboratory test gave the most dense aggregate, then after the original flushcoat wore off, but before disintegration started, reflushcoat the pavement, repeating the reflushcoating treatment periodically as needed. This procedure

would give an almost indefinite life to the pavement, but was unsatisfactory because after the guarantee maintenance period expired, the pavement was quite likely to be neglected by the city and reflushcoating delayed until it was too late.

Another expedient, was that whenever a ravelled place appeared in the surface, to thoroughly clean the spot, paint it lightly with a liquified asphaltic paint, and apply a fine aggregate mixture, and compress same to the level of the surrounding pavement. This method of repair was devised by E. C. Wallace about 1907 and was and is still largely used when necessary.

It was found that repairs made in this manner were more resistant to abrasion than the surrounding pavement composed of coarser mixture; however, frequently these fine mixture patches would be "shoved" out of position by the traffic. This usually occurred when the mixture had been used to fill a depression in an otherwise smooth, well closed surface, for in such places the new mixture was merely bonded to the old by the asphaltic paint, and was not knitted into the old mixture, as did occur when it was used to patch a coarse, open or ravelled spot.

In the spring of 1909, E. C. Wallace, who had been engaged for several years in laying pavements under the Warren patents, severed his connection with Warren Brothers Company, and shortly thereafter applied for the issuance of a patent upon a new pavement. This application was finally allowed and was issued as patent No. 959976 in 1910.

Shortly after the issuance of this patent the matter was brought to attention of Warren Brothers Com-

pany and thoroughly investigated, both as to novelty, patentability, and as to its merits as a street pavement.

The novelty, patentability and the merit of the invention all lie in the fact that the pavement produced differs from all previous pavements in the structure of its wearing surface.

A photograph of a vertical cross section of this pavement wearing surface is shown in Exhibit E, and by comparison with photographs shown in Exhibits A and D it is obvious that the three wearing surfaces differ in many respects, but particularly in:

Exhibit A.—Sheet asphalt, consists of two separate distinct layers.

1st. A “binder course” composed of crushed stone and asphalt cement.

2nd. A surface layer of fine aggregate (sand and dust coated with asphalt cement.

3rd. There is a distinct horizontal line of cleavage between the two layers.

Exhibit D.—F. J. Warren pavement—(Bitulithic)

Consists of a true bituminous concrete, uniform in composition in all parts, with the coarse, medium and fine sized particles of aggregate indiscriminately and uniformly distributed throughout the mass from top to bottom.

Exhibit E.—E. C. Wallace pavement—Pat. 959976 (Warrenite-Bitulithic).

Consists of one integral compact layer, composed of a true bituminous concrete mixture at the bottom, and of a fine aggregate bituminous mixture at the upper surface;

This fine upper mixture being so blended into the upper part of the coarser lower mixture that there is no horizontal plane of cleavage between the two mixtures.

When this product was brought to attention of Warren Brothers Company it was immediately recognized that if the ideas involved could be successfully and commercially carried out in practice, it would solve the difficulties encountered by the Warren pavement, for the following reasons:

1st. The bituminous concrete forming the lower portion provided the stability needed to resist displacement by traffic.

2nd. The rich bituminous fine aggregate mixture forming the upper surface, provided a plastic, waterproof and tough wear resisting protection to the coarser stone below.

3rd. The fact that there was no plane of cleavage between the two mixtures, but instead there was a zone of blending, proved that the fine aggregate upper mixture could be made extra rich in bitumen without danger of it shifting and shoving under traffic.

4th. Due to the fact that this fine aggregate surfacing mixture would protect the stones in the coarse aggregate lower portion from wear, it was obvious that this lower portion could be designed on the basis of using those proportions of each size particle of aggregate which laboratory tests showed would give the densest aggregate and minimum of voids and thereby also a maximum of stability.

5th. Instead of being uniform in composition, and

therefore uniform in physical characteristics throughout its depth, it is stable at bottom and center where stability is needed, yet plastic, wear resistant, and water resistant at the surface, where these properties are essential to success.

The principal reason for questioning whether this construction could be successfully carried out in commercial practice, is the fact that in order to produce the zone of blending between the bituminous mixtures forming the upper and lower portions of the pavement it is obviously necessary to apply the upper fine bituminous mixture before the lower coarse aggregate mixture has become chilled to such an extent that the bituminous cement in the lower portion has become so hard that it is strong enough to prevent motion of the coarse particles when the fine mixture is compressed by rolling.

In order to carry out the above it is necessary for the contractor to have on the street at all times a supply of both the fine and coarse mixtures and as this had never been attempted before with any type of pavement, it was considered by most practical paving men as impossible, and that in actual practice it would be found impracticable as the amount of fine mixture which would be wasted by becoming chilled before being used would make the construction prohibitively expensive. It was also assumed that it would be impractical for the paving plant to attempt to produce a few loads of coarse mixture, then one load of fine mixture and thus alternate from one mixture to the other all day.

In order to determine definitely the commercial practicability of the invention and to verify laboratory tests by actual experience under traffic Warren Brothers Company laid one block on Cove St., New Bedford in 1910 and watched the results under heavy cotton mill traffic for two summers and winters. The results were so favorable, they laid in the summer of 1912, 16,394 square yards on the New Bedford-Fairhaven Bridge, and a short stretch on Commonwealth Avenue, Boston, also subjected to heavy traffic.

The results of all of above were so satisfactory that in the following year, 1913, it was decided to adopt this structure generally, as rapidly as possible.

Affiant further states that he has examined the specifications in suit entitled "Asphaltic Concrete Type A" and believes that compliance with these specifications will produce a product which infringes the claims of U. S. Patent No. 959976.

Affiant further states that he has carefully examined samples of pavement which he is advised came from the pavement laid by the defendant on Blackstone Avenue, Fresno County, California, under said specifications, and believes that said pavement was constructed substantially in accordance with the requirements of letters patent No. 959976.

George H. Perkins.

Subscribed and sworn to before me this 27th day of May, 1921.

(Seal)

Robert Fowler.

Notary Public.

Commission Expires March 7, 1924: ROBERT FOWLER, Notary Public.

ACTUAL SIZE.

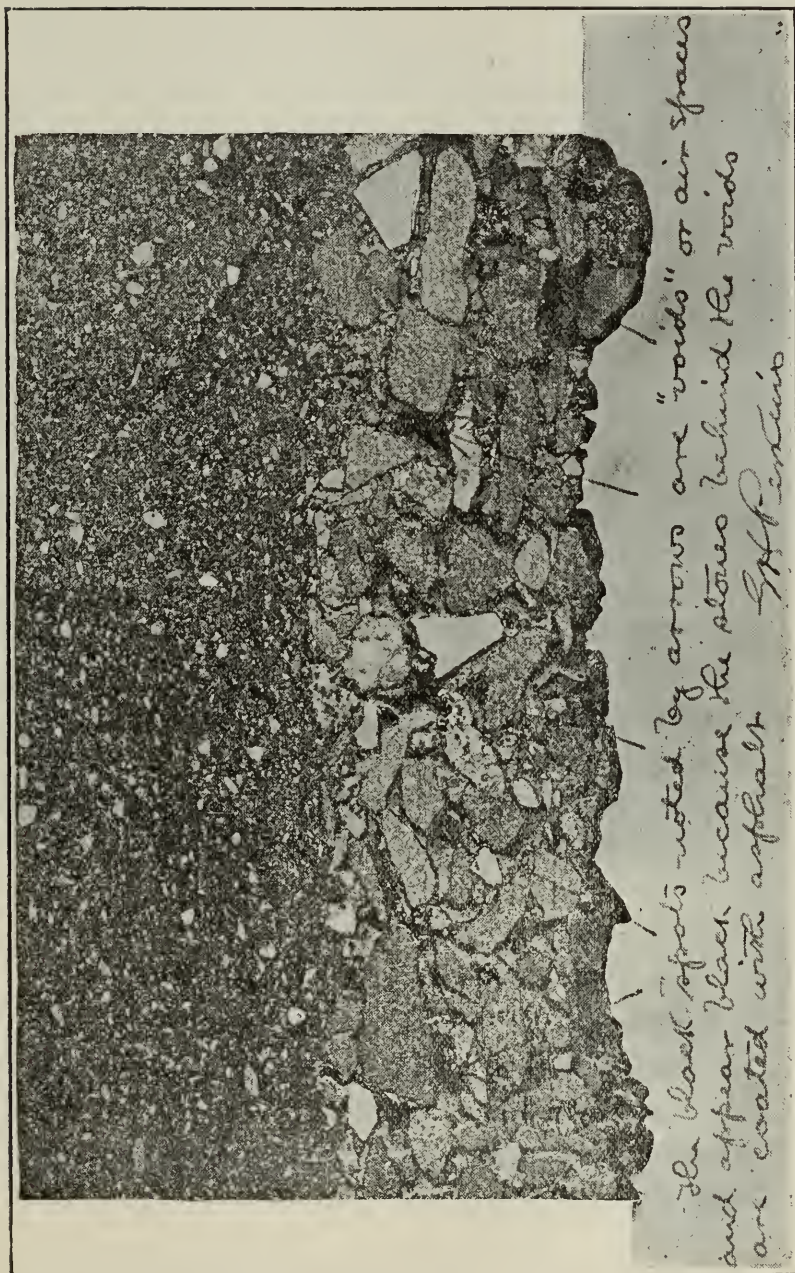


EXHIBIT "A"

(Affidavit of G. H. Perkins)

Vertical sawed cross section of standard Sheet Asphalt pavement showing fine aggregate wearing surface mixture on asphaltic binder course.

Note—pavement plainly consists of two separate distinct layers.



EXHIBIT "B"

(Affidavit of G. H. Perkins)

Photograph of Sheet Asphalt Pavement showing deep ruts caused by traffic, due to the asphalt cement in the wearing surface mixture having softened in hot weather and thereby allowing the mixture to be displaced by the weight of vehicles.



EXHIBIT "C"

(Affidavit of G. H. Perkins)

Photograph of waterbound macadam road, to show raveling and "chuck holes" caused by traffic.

ACTUAL SIZE.

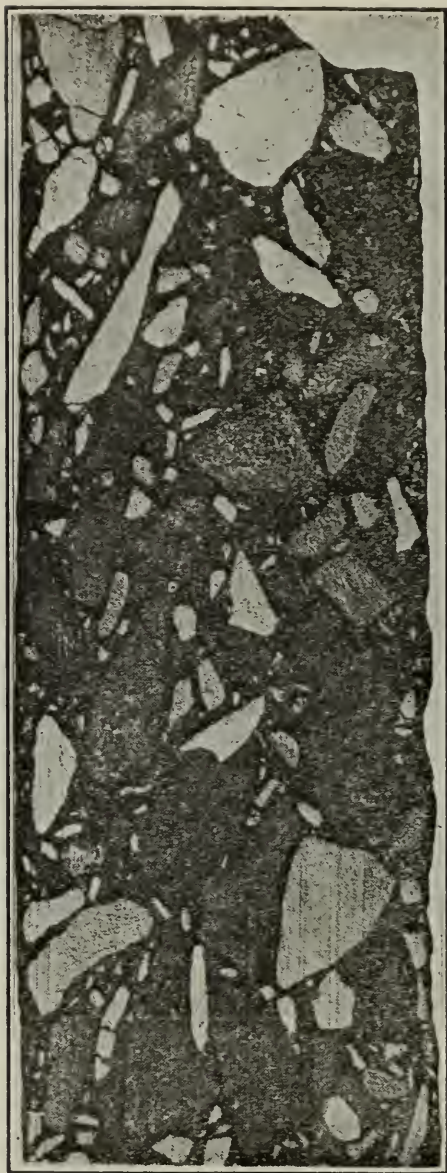


EXHIBIT "D"

(Affidavit of G. H. Perkins)

Photograph of vertical sawed cross section of pavement laid in accordance with invention of F. J. Warren, described in U. S. Patent #727505.

Note—pavement consists of single layer in which the coarse, medium and fine sized particles are uniformly distributed throughout the mass from top to bottom.



ACTUAL SIZE.

EXHIBIT "E"

(Affidavit of G. H. Perkins)

Photograph of vertical sawed cross section of pavement laid in accordance with invention of E. C. Wallace, described in U. S. Patent #959976.

Note—pavement consists of one integral, compact layer composed of "a lower course * * * made up of large pieces of stone, smaller pieces of stone and stone dust, mixed with * * * bitumen * * * and an upper thin course disposed on the lower course and made up of finely divided mineral matter mixed with * * * bituminous binding material * * * and blended with the coarse mixture at the top of the mass, whereby the two layers are bonded into one and a compact, rigid layer, densest at the top, is formed."

Endorsed: Received copy of within this 2d day of June, 1921. Frederick S. Lyon Leonard S Lyon Sol. for Def's.

FILED JUN 3 1921 CHAS. N. WILLIAMS,
Clerk By P W Kerr Deputy Clerk

[TITLE OF COURT AND CAUSE.]

AFFIANT, James W. Howard, being duly sworn, declares and says:—

That he is Consulting Engineer on Roads, Streets and Pavements and has his office at No. 1 Broadway, New York, N. Y. and his Pavement Testing Laboratory in Newark, N. J.

That he was born in 1860 at West Point, New York; after finishing public high school he graduated from Phillips Academy, Andover, Mass.; graduated as Civil Engineer from the Rensselaer Polytechnic Institute, Troy, N. Y.; studied in France, Switzerland and Germany;

That after final graduation as an engineer, he then began practical work as pavement foreman; next taking charge of and personally directing pavement construction, selecting and using paving materials, preparing pavement specifications, interpreting pavement specifications of others, establishing and operating his pavement testing laboratory for determining the relative, scientific and practical values of paving materials as well as determining whether or not paving materials and pavements meet requirements of quality needed or specified in contracts;

That he has made a special study of pavement specifications including those for bituminous and asphalt compositions and has long experience in preparing such specifications and examining and constructing pavements in accordance therewith;

That he is familiar with and has made a special practice of composition pavements including various bituminous compounds known by such names as asphalt, sheet-asphalt, rock-asphalt, asphalt-macadam, asphalt-concrete, bituminous-macadam, bitulithic, tar-macadam pavements;

That for more than thirty two years he has made a special study and practice of the construction and testing of pavements and paving materials of all well known and usual kinds as well as of many new, experimental and patented kinds, serving in many of the principal and minor cities of the United States and also in several cities in Canada, Mexico, England, France and Germany;

That he has made a careful study for many years of and is familiar with letters patent or patents of the United States, England, Germany and France, for the improvement or construction of paving materials and pavements of many kinds including those requiring bituminous or asphalt composition; and has had much experience in interpreting and comparing patents;

That he was and is familiar with the kinds of pavements and the state of the paving art, at the time of the issue on May 5, 1903, of the Warren U. S. patent 727,505, and at the time of the issue, May 31, 1910, of the Wallace, U. S. patent, 959,976;

That Warren patent 727,505 was a "pavement structure" or single layer of the same uniform composition and density throughout from its top to bottom and to an extent which was then new and novel in a bituminous pavement, and was useful as shown by the success of several million square yards in successful use in many cities for many years; that said Warren patent is therein described to be "A street-pavement mixture composed of mineral ingredients ranging in grades from three inches down to an impalpable powder in combination with a bituminous binder"; also a "Pavement structure composed of a mixture of mineral ingredients and a plastic binder, the space between the mineral ingredients being less than twenty-one percent of the whole, and the plastic binder occupying said space."

That he is familiar with the fact of the validity, meaning the novelty, and usefulness of the said Warren patent has been sustained by the decisions of various courts of the U. S.

That he has carefully examined Wallace patent number 959,976 granted by the U. S. patent office May 31, 1910 and is familiar therewith, and that he has examined pavements laid in accordance with said patent during and since 1913;

That said Wallace patent, briefly stated, describes and requires the process of making and laying as well as the resulting finished pavement as follows:

"A prepared foundation of any character consonant with the purpose of my (Wallace) invention" may be used. Then, First; "The lower course, B,

of the novel and advantageous pavement" is spread, but not finished by compaction, and Second; "The upper course, C, or surface coating thereof" is laid on top of the lower course. Third; Immediately and fully compact the second course on and into the lower course, blending it into the lower course.

The lower course is entirely different in composition from the upper course; the lower course consisting of "large pieces of stone, smaller pieces of stone and stone dust mixed with sufficient bitumen to thoroughly coat all of the particles" of stone and dust. The upper layer or "upper course is composed of finely divided mineral matter mixed with sufficient bituminous binding material to thoroughly coat all the particles." Then this upper course mixture of sand or equivalent fine screenings and bituminous or asphalt cement is "spread on the lower course."

The next and final operation to complete the finished Wallace pavement, as per patent, 959,976, is to compress the two courses to the extent necessary and thus tie and bind the upper or surface coating course to and into the lower or stone mixture course; blending these into one finished pavement surface.

I have read the specifications in suit for the construction of Fresno County Highway and find therein three sections entitled as follows:

"Section VI. Asphalt Wearing Surface, Type A."

"Section VII. Asphaltic Wearing Surface, Type B."

"Section VIII. Asphalt Concrete Pavement."

A reading of the above named sections VI, VII and VIII show the following:

1st. Section VI is a specification for an asphalt wearing surface only and does not describe of what character the base or foundation shall be.

2nd. Section VII is also a specification for asphaltic wearing surface only and does not describe of what character the base or foundation shall be.

3rd. Section VIII is a specification for a complete "Asphaltic Concrete Pavement," describing the treatment of the sub grade and also of the foundation or "base course," which it describes in detail as an asphaltic concrete.

Under this Section VIII the wearing surface shall be either that described under Section VI, known as "asphalt wearing surface, Type A" or shall be as described in Section VII, "Asphaltic wearing surface Type B."

4th. A careful reading of the specifications for asphalt wearing surface, Type A, described in Section VI and of Type B described in Section VII, discloses the following:

(A) That the specifications for Type B have been copied verbatim from the specifications printed by and furnished by Warren Bros. Co., describing therein the best methods which in their opinion will produce the best product possible under the Wallace Patent, 959,976.

(B) The portions of specifications for Type A, Section VI, entitled "Item 2" in which is given the proportions of the various ingredients of the lower portion of the wearing surface structure are copied verbatim from said Warren Bros. Co. specifications as shown in the Fresno specifications Section VII, Type B.

(C) That in specification for Type A, item 3 describing the finishing course, the proportions given therein require the use of the same identical mixture as provided by the Type B specifications copied from Warren Bros. Co. specification.

(D) That the remaining paragraphs of the specifications for Type A, Section VI, while not being copied verbatim from the Type B specifications, do require the use of the same type paving plant, do require the production of the same finished wearing surface structure as provided for under specifications entitled Type B.

(E) That the only difference between specifications Type A and Type B is that in the case of Type A the specifications require that the coarse aggregate mixture for the lower course of the wearing surface structure shall receive initial compression before spreading the fine aggregate finishing course.

It is obvious to any practical paving man that the intent of the wording of specification Type A, Section VI, is to produce a pavement wearing surface structure in accordance with the Wallace patent 959,976 that is "comprising a foundation, a lower course thereon made up of large pieces of stone, smaller pieces of stone and stone dust, mixed with sufficient bitumen of proper consistency to thoroughly coat all of the particles, and an upper thin course disposed on the lower course and made up of finely divided mineral matter mixed with sufficient bituminous binder material to thoroughly coat all of the particles, and blend with the coarse mixture at the top of the mass, whereby the

two layers are bonded into one and a compact, rigid layer, densest at the top, is formed.” (See claim 2 of the Wallace patent.)

It is equally obvious that Section VII specifications Type B will produce the same product described above in said patent and that the only difference between the two specifications is that Type B describes a more safe method to follow, in that by spreading a fine surfacing mixture, immediately after the lower coarse aggregate mixture has been spread and without waiting for a preliminary rolling of this lower coarse aggregate mixture, there is less danger of chilling of the lower coarse aggregate mixture, and therefore the proper blending of the fine surfacing mixture with the coarse aggregate mixture in the lower portion of the pavement is better assured.

In other words, both methods will necessarily produce a wearing surface structure strictly in accordance with patent 959,976.

I have read the several patents cited by defendants in this case. None of these describes the Wallace idea of producing a structure for the wearing surface of a pavement by using coarse material and disposing it in its lower and central portions to secure stability, covering these coarse particles with a fine grained, bituminous mixture to protect them from fracture, blending the two courses together while in a plastic condition; producing thereby one “compact rigid layer densest at the top.”

The said Wallace invention and patent 959,976 was a new and novel step in the paving art.

James W Howard

COMMONWEALTH OF MASSACHUSETTS
COUNTY OF SUFFOLK

Sworn and subscribed to before me, this 10th day
of June, 1921.

(Seal)

William F. Haverty.

Notary Public.

Commission Expires March 24 1927 WILLIAM F.
HAVERTY, Notary Public.

[Endorsed]: Received copy of within June 15, 1921. Leonard S. Lyon, Sol. for Defendants.

FILED JUN 17 1921 CHAS. N. WILLIAMS,
Clerk By R S Zimmerman Deputy Clerk

[TITLE OF COURT AND CAUSE.]

AFFIDAVIT

STATE OF CALIFORNIA)
) SS
County of Los Angeles)

Elmer O. Slater, being first duly sworn on oath, deposes and says: I am now a resident of the City of Los Angeles, State of California. For the eleven (11) years last past I have been in charge as manager of the Los Angeles Laboratory of Smith-Emery Company, chemical engineers and chemists, during which time I have made and supervised the making of all manner of chemical tests and analyses.

On June 23, 1921, Chris P. Jensen requested of me that I make a test of the wearing surface laid on Blackstone Avenue, Part of Route 5, Section A, Fresno County Highway System, and for that purpose

turned over to me a specimen bearing a legend "Specimen of Wearing Surface cut from Blackstone Avenue work, March 11, 1921." This specimen consisted of two courses, a binder course containing an aggregate of graded stony pieces and a top or finishing course containing an aggregate of finely divided mineral matter. The binder course was approximately one and one-quarter inches in thickness and the finishing course was approximately one-quarter inch in thickness. The two courses were bonded together but were distinct and not blended.

This specimen was tested to ascertain the relative density of the two courses and for that purpose the top one-quarter inch finishing course was removed from the binder course. I found that the specific gravity of the binder course was 2.48 and the specific gravity of the finishing course was 2.14 and that the weight of the binder course per cubic foot was 154.8 pounds and the weight of the finishing course per cubic foot was 133.6 pounds. This test was accurately performed and the results given are correct.

I, therefore, hereby certify that the top one-quarter inch finishing course of said Blackstone Avenue pavement is in fact of less density than the binder course upon which it rests.

Elmer O. Slater

Subscribed and sworn to before me this 5th day of July, 1921.

L. Belle Weaver

Notary Public in and for the County of Los Angeles,
State of California.

in the above entitled suit and with the specifications for "Type B" pavement appearing at pages 16A-16C of said Exhibit. As Chief Inspector for Fresno County Highway System I have personally supervised and inspected the laying of both of said "Types A and B" construction in the County of Fresno and have for years been familiar with the surfacing of pavements in accordance with United States Letters Patent No. 727,505 granted May 5, 1903, to F. J. Warren. As Chief Inspector for Fresno County Highway System, I have inspected the materials employed, the methods of laying and construction obtained with "Types A and B" pavement in Fresno County Highway System.

With particular reference to part of Route 5, Section A, Fresno County Highway System, being that portion of Blackstone Avenue in the County of Fresno, State of California, adjoining the city boundary of the City of Fresno and running northerly therefrom for a distance of approximately 600 feet, I personally inspected the materials employed, the methods used and the construction obtained during the surfacing of that particular pavement. I am familiar with the photograph constituting "Exhibit D" to the affidavit of Chris P. Jensen in the above entitled cause. That photograph was taken in my presence during the actual surfacing of said Blackstone Avenue job, and is a true illustration of the method employed in the laying of said wearing surface. That wearing surface was laid in accordance with said specifications "Type A". As illustrated in said "Exhibit D" the

mixture for the binder course was first spread on an asphaltic concrete foundation. After this mixture had been raked or leveled the same was rolled by means of the 12 ton steam roller appearing in said photograph. The mixture for the finishing course was thereupon spread upon the compressed binder course and the whole again rolled by the same steam roller. The completed pavement comprised a base, a binder course of approximately 1-1/4 inch in thickness and a top or finishing course of approximately 1/4 inch thickness. The materials of these two courses were not mixed or blended in the pavement as completed. The two courses were bonded together along a somewhat irregular line by the cementing properties of their bituminous contents but the composition of the two courses remained entirely distinct. I have examined the specimen "Exhibit E" to the said affidavit of Chris P. Jensen and know that the same was removed from said Blackstone Avenue pavement on March 11, 1921. It will be noted from an examination of this specimen that none of the stony pieces from the binder course protrude through the top quarter inch finishing course. Since completion of this Blackstone Avenue job I have personally kept said pavement under observation. I am familiar with "Exhibit F" to the said affidavit of Chris P. Jensen and know the same to be a specimen removed from said Blackstone Avenue job about four months after the pavement was completed and opened to traffic. An examination of this Exhibit shows that in actual service the distinctiveness of the top and binder courses is maintained. There is, in fact, no blending of said courses.

As Chief Inspector for the Fresno County Highway System I have personally inspected and supervised the surfacing of other pavements in Fresno County in addition to said Blackstone Avenue job in accordance with said "Type A" specifications. "Exhibit H" to the said affidavit of Chris P. Jensen is a true photograph to my knowledge of actual laying of said wearing surface on Del Rey Avenue, Route 18, Fresno County. This photograph illustrates the method employed with all "Type A" construction of rolling the binder course prior to spreading the finishing course. This binder course was rolled prior to the spreading of the finishing course by means of the 12 ton roller illustrated in the photograph. To my knowledge the binder course of all wearing surfaces laid pursuant to said "Type A" specifications in the County of Fresno has been rolled with a 12 ton roller prior to the spreading of the finishing course. In all cases this rolling of the binder course consolidates the same and causes the materials thereof to assume their final relative positions prior to the spreading of the finishing course. "Exhibit I" to the said affidavit of Chris P. Jensen is to my knowledge a specimen of the binder course of the wearing surface laid on Route 8 near Clovis, Fresno County Highway System. This wearing surface was laid in accordance with said "Type A" specifications. The said Exhibit, or specimen, was removed during actual construction of the pavement after the same had received the customary compression from the 12 ton roller and prior to the spreading of the top or finishing course.

As stated above I am familiar with and have supervised as Chief Inspector the laying of wearing surfaces in accordance with said "Type B" specifications. The fundamental distinction between the "Type A" construction and the "Type B" construction is that in the former the prior course is rolled prior to spreading of the surface mixture, while in the latter case the top course is spread on the binder course before the binder course has been rolled or otherwise compressed. I consider the "Type A" construction to be vastly superior to the "Type B." I base this opinion upon experience had for many years with asphalt concrete pavements and upon my observation of comparative results obtained. With "Type B" construction it is impossible to obtain a uniform distribution of the top or finishing mixture. This is due to the fact that the uncompressed binder course presents a very irregular surface upon which it is impossible to uniformly spread the mixture for the finishing course. I have found this results in the mixture for the finishing course varying greatly in thickness from 1/2 inch down to so slight a thickness that it does not cover the large rocks of the binder course. Upon compression of the "Type B" pavement the rocks or large stony pieces from the binder course protrude at the top of the pavement and the riding surface has a tendency to wave, due to the uneven distribution of the finishing course. It is elementary that the riding surfaces of any asphalt concrete pavement should have no tendency to wave, as such tendency will be aggravated in use. Furthermore, the appearance at the rid-

ing surface of stony pieces will result in their fracture and displacement, due to their rigidity. This will produce a rapid disintegration of the riding surfaces and will render it susceptible to raveling. One of the most important functions of a top finishing course is that it may provide a seal coat for the rest of the pavement. With "Type B" construction the function of a seal coat is destroyed because each stony piece protruding at the top of the pavement will provide an entrance point for moisture. On the other hand, with "Type A" construction, I have found that the compression of the binder course provides a relatively smooth surface upon which the top mixture may be evenly and uniformly spread. When the same has been compressed, this top mixture will be of uniform thickness, in all cases approximately 1/4 inch, and will constitute a perfect seal coat. This top mixture, being of uniform thickness, will compact evenly under the roller and will not tend to wave. I am familiar with "Exhibits A and B" to the said affidavit of Chris P. Jensen. Both of these Exhibits are specimens taken from the Fresno County Highway System and the pavements of which they are a part, were laid pursuant to said "Type B" specifications and were inspected by and approved by representatives of Warren Brothers Company. "Exhibit A" was removed to my knowledge from Ventura Avenue, Route 15, Fresno County Highway System during the first week of June, 1921. "Exhibit B" was removed to my knowledge from White's Bridge Avenue, Route 1, Fresno County Highway System in June, 1921. These speci-

mens are characteristic samples of the results obtained on the Fresno County Highway System with said "Type B" construction.

I am firmly, therefore, of the opinion that the compression of the binder course prior to the spreading of the finishing course as employed in said "Type A" construction is far superior and preferable to the method employed in said "Type B" construction. I was amused in reading the affidavits of George H. Perkins and Edwin C. Wallace filed in the above entitled case, to note their derogatory statements in regard to pavement laid in accordance with United States Letters Patent No. 727,505. It was the practice under such patent to my knowledge to employ a finishing course constructed by applying a flush coat of asphalt by means of a squeegee and thereupon roll screenings into the same. I laid this pavement for years under contracts authorized by plaintiff Warren Brothers Company and under inspection of representatives of said company. Until shortly prior to the expiration of said patent No. 727,505, to my knowledge, plaintiff Warren Brothers through its representatives, consistently asserted that the method of that patent was the most practical and discouraged the use of a finishing coat consisting of previously mixed finely divided aggregate and bitumen. It was only shortly before that patent was about to expire, to my knowledge, that plaintiff Warren Brothers Company, attempted to introduce or laud the method or type of construction embodied in said "Type B" specifications.

Harry E. Leyden

Subscribed and sworn to before me this 1st day of July, 1921.

(Seal)

Ben H. Johnson

Notary Public in and for the County of Fresno,
State of California.

[Endorsed]: Rec'd copy of the within this 5th day of July, 1921 Paul S Honberger Sol. for Plaintiff
By M. M. W. FILED JUL 5 1921 CHAS. N. WILLIAMS, Clerk By Edmund L. Smith Deputy Clerk

[TITLE OF COURT AND CAUSE.]

AFFIDAVIT.

STATE OF CALIFORNIA)
County of Fresno) SS

Chris P. Jensen, being first duly sworn on oath, deposes and says: I am now a resident of the City of Fresno, State of California. I was born in Contra Costa County, California, November 9, 1873, and received my grammar school education in the City of Fresno. I am a graduate of Oakland High School, Oakland, California; I completed the course of civil engineering at Van der Naillen's School of Engineering in San Francisco and received the degree of C. E., and from the years 1900 to 1909 I was engaged in the private practice of general engineering in and about Fresno, California. Between the years 1909-1913 I held the position of City Engineer of the City of Fresno, California; during that time I prepared all

specifications for pavements constructed in the City of Fresno, and had general supervision of the actual laying of the same. At that time I became thoroughly familiar with bituminous concrete pavements. From 1913 to 1919 I engaged in the private practice of general engineering in and about Fresno. Since January, 1919, I have been county surveyor of the County of Fresno. The County Surveyor is the County Engineer. As County Surveyor or Engineer I have prepared the specifications for all pavements constructed by the County of Fresno since the commencement of my term of office. All of such pavements have been laid under my supervision. My duties have rendered me thoroughly acquainted with the construction of bituminous concrete pavements. During the period when I was City Engineer of the City of Fresno I was also Chairman of a Committee of California Municipalities on Streets and Highways, and in that capacity reviewed the specifications adopted by the California Highway Commission and the various Municipalities. While City Engineer of the City of Fresno I prepared the specifications for and supervised the construction of some 250,000 square yards of pavement, mostly asphaltic concrete. Since I have been County Surveyor of the County of Fresno I have prepared all the specifications for the construction of 1,350,000 square yards of asphaltic concrete composition pavement, 900,000 square yards of which have been practically completed under my supervision. I am a member of the American Society of Civil Engineers.

THE PATENT IN SUIT.

The subject matter of the present controversy relates to so-called bituminous concrete pavements; the suit being brought under United States Letters Patent No. 959,976, granted to Edwin C. Wallace on May 31, 1910. After thoroughly studying that patent I find the following:

The patent describes a base A - stated to be of any kind, and not defined other than that it -

“may be of any character consonant with the purpose of my invention.” (p. 1, lines 41-42)

Upon this base the patent specifies there shall be placed a covering formed by a lower course B and a surface course C. The lower course B is stated to consist of:

“large pieces of stone, smaller pieces of stone and stone dust mixed with sufficient bitumen of proper consistency to thoroughly coat all of the particles.” (p. 2, lines 49-52)

The patent contains no further or better specification or definition of the proportion or sizes of these mineral constituents, and calls very generally for -

“stone of a size to pass through the interstices of a screen giving a stone, the largest of which, is the maximum size desired, and this stone together with the smaller pieces of stone and comminuted stone or dust in the state that the whole run is discharged from a crusher * *” (p. 1, lines 47-53)

There is no definition in the patent of the character of “bituminous binding material” to be employed.

The surface course C is stated by the patent to be composed of -

“finely divided mineral matter mixed with sufficient bituminous binding material to thoroughly coat all of the particles” (p. 2, lines 56-58)

No description of the character of the “finely divided mineral matter” utilized in the surface course C is contained in the patent except the statement:

“sand or crusher screenings (comminuted stone) or both * *” (p. 1, lines 60-61).

As in the case of the lower course B no definition or qualifying description is given of the “bituminous binding material” utilized in the surface course C. No proportions are given.

The patent describes that the pavement shall be laid by first distributing the lower course B on the foundation and spreading the surface course C.

“in a thin coat or layer over the course B laid as before described but not compressed or subjected to pressure or tamping” (p 1, lines 64-67) and that thereupon the laid materials comprising the courses B and C are subjected

“to initial pressure or compression, preferably by moving a heavy roller over the same” (p 1, lines 70-72)

The patent is entirely indefinite to the reader as to how thick course C shall be laid. No information is given on this except that course C shall be “thin”, which is necessarily vague and from a practical standpoint entirely uncertain. To one man a thickness of three inches for the course C on a pave-

ment 40 feet wide would appear "thin"; while to another a thickness of one-half inch on the same pavement might appear "thick".

Nothing is said in the patent concerning the temperatures at which the courses are to be laid. Whether the course B is to be laid hot or cold is not disclosed in the patent. The same is true as to the course C. Nor is it disclosed whether the course B shall be hot or cold when the course C is spread thereon. The patent is likewise silent concerning the requisite temperature of the pavement during compression.

The patent contains no suggestion or direction as to how soon after the spreading of course B the course C shall be spread. Nor how soon after spreading course C the compression shall take place.

It is important to note that the patent in suit emphasizes and positively directs that the course B shall not be rolled or in any manner compressed before the course C is spread thereon. This appears in at least nine different places in the page and a half constituting the printed specification. At page 1, line 65, the patent states that the course B is "laid as before described but not compressed or subjected to pressure or tamping." At page 1, line 70, it is stated that after the courses B and C are laid they are together subjected to "initial pressure or compression." At page 1, line 86, it is stated that the courses B and C are "pressed, by the single compression referred to." At page 1, line 109, it is stated that the course C is raked in a thin layer over the course B and brought to a true surface "before" the application of the only

pressure to which the composite pavement is subjected." At page 1, line 112, the patent again specifies "single compression." The patent disclaims the rolling of the course B prior to the laying of the course C and warns that such procedure would prevent and interfere with the result sought, as follows:

"In this connection it will be appreciated that the single compression of the whole mass simplifies and cheapens the production of the pavement, and instead of preventing or interfering with the adherence of the upper course to the lower course (as is the case when the lower course is rolled or otherwise pressed precedent to the application and pressing of the upper course) ****" (p 1, line 111, p 2, line 8).

At page 2, line 26, the patent reiterates that the course C is added to the course B "before compression." At page 2, line 53, it is again stated that the course B is laid "without compression" and at line 60 that the course C is pressed and "thereafter blended and bonded with the lower course by compression." The fact that the lower course B is not compressed until after the spreading of the surface course C appears to me to be the most definite and emphatic feature set forth in the patent.

After thoroughly studying the patent it appears to me that the sole feature asserted by the patentee to be original and novel in his pavement is the spreading of the course C prior to any compression of the course B followed by the initial and only compression of the two courses together to produce a single compact

integral mass densest at the top. Thus, the patentee states:

“Attention is here invited to the fact that while I describe the pavement made in accordance with my invention as having two courses B and C, the completed pavement is not a multilayer pavement, but on the other hand the two courses are practically pressed, by the single compression referred to, into a single mass.” (p 1, lines 80-87)

This feature has been embodied in and made the subject of the two claims granted in the patent. In claim 1 it appears in the phrase -

“thereafter blended and bonded with the lower course by compression whereby the two courses are made a compact and substantially integral mass which is densest at its top.”

The same is incorporated in claim 2 as follows:

“blended with the coarse mixture at the top of the mass, whereby the two layers are bonded into one and a compact rigid layer densest at the top is formed.”

Attention must be given at this point to the fact that the patentee's asserted distinctive feature involves two separate physical characteristics. The patent definitely prescribes that the courses B and C shall be both bonded and blended together. For instance, in the phrase from claim 2 last quoted it is stated that the course C is “blended with the coarse mixture at the top of the mass (course B)” and further that “the two layers are bonded into one.” Bonded and blended are entirely different physical conditions. Two sub-

stances are bonded when they retain their separate integral entities but are made to adhere one to the other. Thus the courses B and C would be bonded if they are caused to adhere by the cementing agency of their bituminous covering. The bituminous content of all multi-course pavements is the bonding agent. With all such pavement this bonding was along an irregular line (See Exhibit A to affidavit of G. H. Perkins). Two substances are blended only when they are so mixed that they lose their respective identities. For example, when cream is stirred into coffee the two become so intermingled that they become as one. In the pavement of the patent the courses B and C would be blended if their constituent parts were so mixed and intermingled that they lost their respective identities. This blending should be distinguished from a mere bonding along an irregular surface. In the latter case the material of one course will fill the interstices along the irregular surface of the other, but except for the irregular line of juncture the two courses will remain entirely distinct. The Wallace patent in calling for a blending as well as a bonding of courses B and C prescribes a complete merging of the upper course in the lower course so that the former is completely absorbed in the latter. I base my opinion upon the text of the patent and upon observation of pavement actually laid in the manner specified therein. The patent clearly states that the two courses shall be compressed and intermingled as follows:

“the two courses are practically pressed by the single compression referred to, into a single mass.” (p 1, lines 85-87)

“whereby the two courses are made a compact and substantially integral mass which is densest at its top.” (p. 2, lines 61-64)

“whereby the two layers are bonded into one and a compact rigid layer densest at the top is formed.” (p 2, lines 76-78)

This text to me clearly indicates a resultant single mass “densest at the top.” This expression would be improper unless the two courses were completely blended and mixed throughout. If there remained a top layer consisting solely of finely divided mineral matter and bitumen, the pavement would not be densest at the top. To the contrary, this top layer would be in fact of less density than the binder course. This is due to the well known fact that a mixture of graded mineral matter (large stone, smaller stone and stone dust) as in course B, contains a less percentage of voids than fine material (sand) as in course C.

That the above will result from following the method prescribed by the Wallace patent is borne out by actual pavement constructed according thereto. In Exhibit “5” to the Bill of Complaint (beginning at page 16A) appears specifications for “Asphaltic Wearing Surface, Type B”. These specifications were prepared by me from the standard specifications submitted by plaintiff, Warren Brothers Company, purporting to be the pavement of the patent in suit. Under my supervision the County of Fresno utilized this Type B construction on Ventura Avenue, Route 15, and White’s Bridge Avenue, Route 1, Fresno County

Highway System. This surfacing was inspected and approved as laid by a representative of plaintiff, Warren Brothers Company. I observed during this construction that the finishing course (course C) is in fact pressed or merged completely into the binder course (course B), so that there protrudes at the top of the completed wearing surface a material percentage of the stone pieces spread as constituents of the course B. To illustrate the foregoing, I submit as Defendants' Exhibit A herewith a specimen of completed wearing surface removed during the first week of June, 1921, from said Ventura Avenue, Route 15. This surfacing was laid within the last nine months. This is a specimen of the construction or product obtained by following said specifications Type B, viz., the Wallace Patent in suit. Attention is directed to the fact that the courses B and C are completely blended or merged to such an extent that stone pieces from course B appear at and constitute part of the top or riding surface. This has been the experience had with the entire construction of wearing surface in Fresno County under said Type B specifications. As a further illustration of the Wallace product, I submit as Defendants' Exhibit B, a second specimen taken in June, 1921, from White's Bridge Avenue, Route 1, Fresno Highway System. The wearing surface from which said Exhibit B has been taken was laid within the last six months and in accordance with said specifications, Type B. This also illustrates the protrusion of stony pieces from the binder course at the top of the pavement and the

complete absorption of the finishing course in the binder course.

I have examined the photograph Exhibit E attached to the affidavit of G. H. Perkins in the above entitled cause and do not consider it a correct illustration of results obtained in practical construction with pavement laid in accordance with the Wallace patent in suit. Such Exhibit does not illustrate the appearance of stone pieces at the top of the wearing surface as above described. Nor do I consider that such Exhibit E illustrates a section of pavement laid in accordance with said Wallace patent because the pavement illustrated in said Exhibit is not "densest at the top" for the reasons stated aforesaid. That is to say, said Exhibit E illustrates an uppermost zone of material consisting only of the constituents of course C; necessarily, therefore, containing more voids and being less dense than the material thereunder.

As before noted the patent in suit prescribes that the course B must not be rolled or compressed prior to the spreading of the course C. From my observation of the pavement as laid I am convinced that if the course B was first compressed the result sought by the patent would not be attained, to wit: a blending of the courses B and C to form a mass densest at the top. My conclusion is confirmed by the statement of the patentee Wallace in Patent No. 1,183,507 granted him May 16, 1916. This patent is for a composition pavement of the identical character of that of the patent in suit except it more definitely specifies the proportions of mineral materials in course B. The

patentee there recognizes that course B must not be rolled prior to the spreading of course C if the blending in question is to be accomplished, stating:

“The application of the top course C to lower course B before the latter is compacted is essential to my process as otherwise the blending of the two courses as above described cannot be accomplished.” (p. 1, lines 106-110.)

In brief summary the feature asserted in the patent in suit to be original and distinctive is the spreading of the thin surface layer C on the layer B prior to any compression of the layer B and the blending of the layer C completely into the layer B by the sole compression to which the same are subjected, thereby producing a single integral mass densest at the top. I have found from my observation and supervision of the construction of approximately sixty miles of pavement by the aforesaid Wallace method that the same presents certain serious objectionable features. In the first place it is not possible to properly and evenly distribute the material of course C upon the course B if the course B has not been compressed. This is due to the fact that the uncompressed upper surface of the course B will be irregular and when the material for the course C is spread or raked thereon necessarily such material will not be uniformly distributed. In fact, I have observed large areas of the finished pavement wherein the mixture of course B is uncovered or exposed and other areas where the mixture of course C is as thick as one-half inch. I have found

that this irregular distribution of course C impairs the smoothness of the riding surface because upon compression there will result an unequal compacting due to the different percentages of voids in course C as compared with course B. This produces a tendency of the pavement to wave under the action of the roller. This tendency to wave is continued and aggravated under the stress of traffic because the riding surface will not be of uniform density due to the irregular distribution of course C.

A further serious objection to the method and resultant pavement illustrated in the patent in suit is the appearance or protrusion at the riding surface of a material percentage of stony pieces from course B. As heretofore described this is a necessary result had if the courses B and C are blended together so that the resultant mass is densest at the top, and I have found that in practice with pavement laid in accordance with the aforesaid specifications, Type B (viz. in accordance with the patent) a material percentage of such stones do so protrude. This is so serious an objection from a practical standpoint to the durability of such pavement that in my opinion the same should be condemned as an inefficient structure. Any stony pieces protruding at the riding surface will take direct contact with the traffic. Such stony pieces being rigid will not have the flexibility inherent in a mixture of finely divided mineral matter mixed with bituminous materials. The stone pieces will therefore be subject to fracture and displacement. Thereby the riding sur-

face will become disintegrated and susceptible to raveling. Furthermore, each of such stony pieces constitutes an opportunity for the entrance of moisture into the structure and defeats the function of the wearing surface as a seal coat.

THE PRIOR ART.

It is hardly necessary to state that the use of bituminous binders for cementing mineral aggregates in roads is of very ancient date. Prescott, in his "Conquest of Peru", in speaking of the great road built by the Incas from Quito to Cuzco, makes the following statement: "It was built by heavy flags of free stone, and in some parts, at least covered with a bituminous cement, which time has made harder than the stone itself. In some places, where the ravines had been filled up with masonry, the mountain torrents wearing on it for ages, have gradually eaten away through the base and left the superincumbent mass—such is the cohesion of the material—still spanning the valley like an arch." Further on in speaking of the road built by the Incas, he gives the following footnote: "Father Valesco is in raptures with an 'almost imperceptible kind of cement' made of lime and bituminous substance resembling glue, which, incorporated with the stones so as to hold them firmly together like one solid mass, yet left nothing visible to the eye of the common observer. This glutinous composition, mixed with pebbles, made a sort of macadam-

ized road much used by the Incas, as hard and almost as smooth as marble."

Broken stone roads with bituminous binders were commonly used in most of the large cities of the world for years prior to the filing of the application for the patent in suit. Thousands of miles of this pavement were in use on the city and country roads in the United States prior to 1907. At that time there were many large companies engaged in the construction of such pavements. Among these was plaintiff Warren Brothers. Much had been written on the subject prior to that date. It was a developed industry having certain standard practices long before any asserted invention of Wallace involved here. These established principles and modes of practice are those now utilized.

In 1905 Clifford Richardson of the New York Testing Laboratory published a treatise entitled "The Modern Asphalt Pavement." This book has been utilized to date as a standard authority on pavements of the character here involved. I will not discuss in detail the contents of that book because I understand it will be in evidence here and because it is plain and readable. Generally the book tells how to construct a pavement of the very kind here involved. Chapter I is devoted to "The Base." Chapter II is headed "The Intermediate Course." The latter being course B of the pavement in suit. A number of the following Chapters discuss "The Surface Mixture". This corresponds to course C of the pavement in suit. Chap-

ter XIX entitled "The Street" directs the manner of laying the pavement. The entire volume is complete with details for proportion and selections of materials. Finally as Chapter XXI the author presents a draft of standard specifications, the author stating:

"For the construction of an asphalt which is to meet the requirements of ordinary traffic in a majority of our cities the following, in the author's opinion, will be found to be not only satisfactory to the city but to the contractors who are to do the work."

I have had a copy of Mr. Richardson's book in my possession for some twelve years. I believe it will be evident from a comparison of the aforesaid standard specifications presented by Mr. Richardson, that in preparing the specifications for "Type A" pavement alleged to infringe herein, I have merely utilized knowledge common in the paving industry prior to 1907 and in fact used nothing original with Wallace.

From the aforesaid book and the references therein to methods employed in the industry for years it is apparent that prior to 1907 it was common to construct a pavement comprising a base, a binder course (course B of the Wallace patent) and a finishing course (course C of the Wallace patent). The materials to be selected, the proportions to be used, and the methods of laying, were all within the knowledge of those skilled in the industry.

The character of an asphalt or bituminous concrete pavement is described by Richardson in the aforesaid book as follows:

“As asphalt pavement consists essentially of a base or support for the surface which is to carry the traffic, itself supported by the soil, and a surface consisting of a mineral aggregate cemented together with asphalt to protect the base from wear and disintegration, between which is commonly interposed either a course of broken stone coated with bitumen, known as binder, or some substitute for it * * *” (Page 3).

The base, as noted above, is merely a support or foundation and may be of any construction that will properly carry the weight of the traffic. Richardson states:

“Base of most varied character has been used in the construction of pavements, including broken stone, with or without a coating of more or less bitumen or coal-tar, macadam, old cobblestone pavement, an old surface of granite blocks or blocks turned and reset, old brick or asphalt-block surfaces, and hydraulic concrete of natural or Portland Cement of varying thickness.” (Page 6)

The binder or intermediate course is designed to relieve the base from shock, distribute the weight of the traffic over a large area of the base and act as a bond between the finishing or riding surface and the base. The binder course must be sufficiently compact and stable to successfully resist the compression and shearing strains from the traffic. Asphaltic concrete has been found to be the most satisfactory binder course. As stated by Richardson:

“The weakness of the ordinary open binder course, where subjected to heavy traffic, can be avoided by filling the voids in the material with fine stone or grit and the remaining voids after this addition, with sand or mineral aggregate corresponding in grading to that of a standard surface mixture.” (Pages 24-25).

The binder course today is the same as the Asphaltic Concrete Binder course above referred to by Richardson in 1905.

The finishing course is intended primarily as a protection for the remainder of the pavement. It serves as a seal coat to prevent moisture from entering into the body of the pavement and initiating disintegration. It should have a certain plasticity to withstand the attrition of traffic. It should assure that the traffic will not directly contact with the larger stony pieces of the remainder of the pavement with resultant fracture and displacement. For these reasons the binder and finishing courses differ primarily in the relative size of their mineral constituents. Richardson defines a wearing surface as follows:

“The asphalt surface, which directly carries the traffic and which is intended to withstand the wear and tear of the same and the action of the elements, is composed of a mineral aggregate and an asphalt cement, that is to say, it is an asphalt mortar or concrete. The mineral aggregate consists of sand, in exceptional cases also of stone, and a fine mineral dust or filler.” (Page 27).

This is the finishing course in use today.

In addition to the actual practice in the paving industry and to the technical publications thereon, there are of record in the Patent Office a large number of patents pertaining thereto and antedating the patent in suit. Except to quite generally disclose the development of the industry it is unnecessary to refer to any but a few of the more pertinent of these patents.

Patent No. 88,139 granted March 23, 1869, to John P. Crawford for Composition Pavement discloses the fundamental principles incorporated in the type of pavements here involved. The pavement of this patent is constructed of a base composed of stones (a) and a bituminous composition (b) filling the surface crevices. Upon the base is laid an intermediate course (c) composed of gravel or broken stone mixed with sand and bituminous material. A finishing course (d) of finer material than the intermediate course (c) such as gravel, sand, etc. mixed with bituminous material forms the top course. The patent states that the top course (d) "is to be rolled even and solid" but is silent as to whether or not the intermediate course (c) is to be first rolled.

Patent No. 375,273, granted December 20, 1887, to C. J. DeSmedt for Artificial Pavement describes a base A made of hydraulic concrete. Upon this base is laid a binder course B. This binder course B is stated by the patent to consist of:

"I may use gravel and sand mixed together, or a combination of broken stone, gravel and sand,

when the same is coated with bituminous compound." (p. 1, lines 81-84)

Over the binder course B is laid a finishing course C described as follows:

"The top or wearing course C is composed of refined Trinidad or other suitable asphaltum, heavy petroleum, or the residuum of petroleum, fine sand, and powdered carbonate of lime, mineral dust, or any other finely-divided mineral material." (p. 1, lines 90-95).

The patent states that the course B shall be rolled "so as to form a substantial bed for the top or wearing course, C." (p. 1, lines 88-89).

The patent contains a clearcut statement of the purposes and advantages of this type of construction as follows:

"The advantage of a pavement laid in the manner described is that the bituminous matter employed in cementing the broken stone of the middle or binding course, B, will cause the wearing surface or top layer, C, to adhere, thus forming a solid or comparatively solid mass, which increases the strength of the pavement and at the same time will be pliable enough to prevent the cracking of the surface layer." (p 2, lines 11-20)

Patent No. 391,222 granted October 16, 1888, to A. L. Barber for Concrete Pavement is stated to be "an improvement on the invention of E. J. DeSmedt patented December 20, 1887, No. 375,273." (p. 1, lines 10-12). It describes a binder and a finishing

course identical with those of the DeSmedt patent. It differs from the latter solely by substituting for a hydraulic concrete base an asphaltic concrete base. The patent specifies that both the binder course (line 53) and the wearing surface (line 65) shall be compacted or rolled.

Patent No. 727,505 granted May 5, 1903, to F. J. Warren for Pavement is a patent which representatives of plaintiff Warren Bros. asserted to cover the mixture utilized in the binder course of all pavements laid under my supervision by the County of Fresno. Because of the representation that the said patent was valid Fresno County paid the royalty demanded for all pavements laid or contracted to be laid by it prior to May 5, 1920, on which date I understood the patent expired. Upon the expiration of the patent we felt that the composition covered by that patent was free to all. Accordingly that binder course was utilized by me in the specifications for the Type A pavement here involved. Since the expiration on May 5, 1920, of that patent Fresno County has not paid or agreed to pay any further royalty to plaintiff. Fresno County has not contracted for laying of any Type B pavement since the expiration of Patent No. 727,505 and royalty has been paid to Warren Brothers Company for all of such Type B construction laid, or contracted to be laid. To the best of my knowledge plaintiff did not seek to introduce the pavement of the patent in suit until Patent No. 727,505 was about to expire. For example, all of the asphalt concrete wear-

ing surface laid in the City of Fresno prior to February 1919, was that of Patent No. 727,505 (employing a flush coat) and under royalty arrangement and inspection of plaintiff. It was not until March, 1919, that plaintiff sought to substitute the pavement of the patent in suit.

Patent No. 727,505 pertains primarily to the composition for the base covering. The patentee asserts in the patent that he is the first discoverer of mixing mineral material in descending grades to decrease the percentage of voids and produce an inherently stable structure. The pavement of this patent is identical with that of the patent in suit so far as the base and binder course of the patent in suit are concerned. Patent No. 727,505 does not particularize that a finishing course or surface must be laid before compression, but does state:

“ * * * it may be covered, if desired, with a relatively thin surfacing of clear asphalt-cement or an asphalt or bituminous composition of any desired nature. *It* some instances there may be rolled into this thin surfacing while it is yet soft sufficient sand, gravel, or fine stone to prevent its displacement by traffic.” (p 1, lines 93-99)

In Figure 3 the drawings illustrate a definite finishing course C consisting of the above mentioned mixture of bituminous material and mineral matter. I am familiar with the construction of pavement in the City of Fresno in accordance with this patent under plain-

tiff's supervision and in all cases a definite finishing course C was utilized.

British Letters Patent No. 17,483 dated December 20, 1887, to Julius Boulton for Improvement in Concrete Pavements also disclose a pavement comprising a base A, a binder course B, and a finishing course C. The base is stated to be made with hydraulic concrete. The binder course B is made of a mixture of bitumen and broken stone, gravel and sand. The finishing course C is composed of bitumen and finely divided mineral material. This patent recognizes the principle invoked in this class of pavement by stating:

“the bituminous matter employed in cementing the broken stone of the middle or binding course B will cause the wearing surface or top layer C to adhere thus forming a solid or comparatively solid mass, which increases the strength of the pavement and at the same time will be pliable enough to prevent the cracking of the surface layer.”

At this point it is apparent that with the prior art developed as above, the novelty embodied in the patent in suit is confined within extremely narrow bounds. So far as the base of the Wallace pavement is concerned it is merely the base old in the art. The placing of a binder course of bitumen mixed with stone pieces of descending grade upon the base is likewise shown to have been standard practice prior to Wallace. In fact plaintiff enjoyed a monopoly thereof for the full term of the Warren patent No. 727,505. The

use of a finishing course upon the combined base and binder course was likewise a well known expedient long prior to any invention of Wallace. This finishing course varied in thickness to suit the judgment of the individual and to meet the conditions of use as interpreted by the one in authority. Richardson states that the specifications for 1886-87 in Washington, D. C., required that course to be $2\frac{1}{2}$ inches after compression (page 20). The general specifications adopted by the City of Fresno on March 16, 1903, for pavements therein specified a finishing course of two inches after ultimate compression. By Section 32 of Ordinance 240 the City and County of San Francisco in 1905 adopted the specifications, certified copy of which constitutes Exhibit C annexed hereto. These specifications call for a hydraulic concrete base, a binder course of bitumen and mineral matter of descending grade and a finishing course of sand and asphalt, the latter two inches thick after ultimate compression. The City of Visalia, California, on February 17, 1904, adopted general specifications No. 1 for street paving, prescribing a wearing surface of asphaltic concrete to have a thickness of one and one-half inches after compression. Richardson in his aforementioned book recommends a finishing course of one inch, saying:

“If, however, the asphaltic concrete is covered with an inch of standard surface mixture the resulting pavement has been found to exceed for durability anything that has been hitherto constructed * * *.” (page 366).

As is pointed out above, the patent in suit does not specify the thickness of the course C and only vaguely and uncertainly states that it shall be "thin". If this means anything of less thickness than one inch it adds nothing of novelty to the asserted invention. In patent No. 683,056 granted September 24, 1901, to Malette and Seybolt, there is described a top course or "dressing" of bitumen and sand which is stated to be of sufficient thickness to merely fill up the interstices and small voids at the immediate surface of the roadway. (p 1, lines 33-40). Patent No. 691,708 granted to Malette on January 21, 1902, refers to the last mentioned patent and as to the top or wearing surface states:

"When such dressing is quite thin, it wears away too rapidly between the stones and is productive of an irregular wearing surface. Therefore, the final coat of sand or tarred screenings, or both, is made of greater thickness, as compared with that described in the patent above referred to. * * *" (p 1, lines 45-51).

Patent No. 675, 430 granted June 4, 1901, to F. J. Warren also demonstrates that there is no novelty in the course C of the Wallace patent being "thin". This Warren patent illustrates a foundation or base A-B. Upon this base is laid a binder course C of bitumen and graded mineral matter. A top course is denominated E and is described as follows:

"The surface of the roadway may or may not be covered with a thin coating of bituminous

mixture of sand, gravel, screenings, or gravel mixed with coal-tar or other equivalent material.”

(p 2, lines 31-35)

It has been heretofore pointed out that Patent No. 727,505 to F. J. Warren also calls for “a relatively thin surfacing” (page 1, line 94). In fact, Fig. 3 of that patent illustrates this course C as of practically the same proportions as the drawing of the Wallace patent shows for the course C.

Patent No. 748,248, granted December 29, 1903, to William Wilson calls for a surface course 7 described as follows:

“A thin top dressing 7 of a bituminous substance mixed with sand, stone screenings, or the like * *” (page 1, lines 83-5).

The foregoing demonstrates that there was nothing novel in Wallace selecting a “thin” top course for his pavement. The difference in the thickness of the top course is a mere matter of degree. The thicker the top course the longer it will last. So far as the respective functions of the various courses are concerned the same are not altered or changed by any difference in the thickness of the top course. While a thicker top course will last longer, it is necessarily more expensive. I determined upon $\frac{1}{4}$ inch as the thickness for the top course of Type A construction because I believe that for its relative expense it is the most desirable.

I have above referred to the fact that the patent in suit in no way indicates the temperatures at which the

operations shall take place. In the affidavit of the patentee on file in the above entitled cause the following statement appears:

“It is well known that in the practice of constructing a pavement built up of layers of mixtures of different composition it is the custom to lay one layer at a time, frequently for several days, then to change to another mixture for the next layer. In the method, covered by the patent in suit, however, it is necessary to follow up the coarse mixture with fine before the former has become cold in order to secure the proper compression on the coarse mixture and also assure the desired blending and bonding of the two mixtures into a single non-cleavable layer.” (p. 14, of affidavit)

If this was novel with Wallace he has failed to make any disclosure of such fact or operation in his patent and the patent does not show the method of making and using the asserted invention in such full, clear or exact terms as to enable a person skilled in the art to which it pertains to make and use the same.

As a matter of fact the laying of one layer of a composition pavement upon another layer, while the latter layer is hot was not new with Wallace. In Patent No. 768,699 granted August 30, 1904, to A. E. Schutte and assigned to plaintiff, the spreading of one layer upon another is particularly recommended to be performed when the lower layer is “still hot” (p 1, line 42). Richardson in his above mentioned

book also suggests the immediate application of the finishing course after rolling the binder course as follows:

“Immediately after rolling it is ready for the application of the surface” (page 387)

As a matter of fact it is not necessary to immediately spread the finishing course after laying the binder course, except in the case of the Wallace method wherein the binder course is not rolled and a complete blending of the two courses is required. In ordinary composition pavements like Type A where the course B is first rolled, the reason for immediately laying course C is to prevent the binder course from being soiled or injured by traffic or otherwise.

There is nothing in the method or product of the patent in suit not shown by the above to have been old with the possible exception of the laying of the course C prior to compression of the course B. We are not much concerned with whether or not Wallace was the first to use that particular sequence of operations, because defendants have not employed and do not care to employ the same in Type A pavement asserted to infringe. But for the information of the court, Patent No. 932,941 granted August 31, 1909, to J. H. Amies illustrates the successive spreading of a plurality of courses prior to the initial compression of the entire mass.

I am satisfied from my review of the development of the paving industry prior to the asserted invention of Wallace, that he entered a well developed field in

which the opportunity for invention was extremely limited. If he added anything at all to the knowledge of that industry it was solely the spreading of his course C prior to compression of the course B, thereby completely blending the top course C to form a mass densest at the top. I do not concede that this was anything more than anyone skilled in the art could have readily done if desired. I believe it was not more extensively adopted prior to Wallace for the reason that it always has been and is bad practice. Defendants utilize the exact opposite of the patented procedure in that regard.

DEFENDANTS' "TYPE A" PAVEMENT.

The specification for the wearing surface of the pavement alleged to infringe in this case appears at pages 14 - 15A of "Exhibit 5" to the Bill of Complaint herein. These specifications were prepared by me. The wearing surface has been denominated "Type A" to distinguish from Type B (the wearing surface of the Wallace Patent). The Type A wearing surface comprises a binder course and a top or finishing course.

The binder course is composed of graded mineral aggregate mixed with bitumen. The grades and proportions appear in the specifications at page 14. This mixture is the one described in the expired Warren Patent No. 727,505. There is nothing in this binder course original with Wallace.

The top or finishing course is composed of finely divided mineral matter and bitumen of the grades and proportions set forth in the specifications at page 14. From the brief review of the prior art set forth above it is apparent that this finishing course mixture corresponds with that in common use in the art long prior to any alleged invention of Wallace.

The specifications at page 14 prescribe that the binder course shall be at least one and one-quarter inches thick and the finishing course at least one-quarter inch thick respectively after compression. The specifications under (f) page 15 state:

“After any binder course has been uniformly spread, as above specified, it shall be given an initial compression by means of a tandem roller weighing not less than three (3) tons. The binder course shall then immediately be covered with the finishing course.”

It is apparent from the above that the specifications for Type A do not embody the only possible distinctive feature of the patent in suit. The specifications do require a rolling and compression of the binder course prior to the spreading of the top course. This is absolutely contrary to the patent in suit. The specifications further require that the finished composition shall comprise two distinct courses (the binder course of $1\frac{1}{4}$ inches and the top course of $\frac{1}{4}$ inch) in direct opposition to the call of the patent in suit for a single mass densest at the top.

To demonstrate the method employed and the result on Blackstone Avenue, part of Route 5, Sec-

tion A, complained of in this case, I present herewith certain photographs and specimens. The photograph, Exhibit D, annexed hereto was taken during the actual laying of Type A wearing surface on the Blackstone Avenue job in February, 1921. The method employed was as follows: The mixture for the binder course was spread on the asphalt concrete foundation. This binder course mixture prior to compression is illustrated in Exhibit D by the legend "Uncompressed Binder Mixture". The binder course mixture was thereupon compressed by means of a steam roller weighing approximately 12 tons. In Exhibit D this roller is indicated by the legend "12 Ton Steam Roller". The binder course after this compression is indicated in Exhibit D as "Compressed Binder Course". Thereafter the mixture for the finishing course was spread upon the compressed binder course. This appears in Exhibit D as "Uncompressed Finishing Course". Finally the finishing course was compressed by the aforesaid steam roller. The compressed finishing course is indicated in Exhibit D by "Finishing Course After Rolling."

A specimen from this Blackstone Avenue job was removed on March 11, 1921, just after laying and is filed herewith as Exhibit E. This specimen is composed of the binder and finishing courses together with a portion of the base. The finishing course slightly exceeds the minimum of $\frac{1}{4}$ inch prescribed by the specifications. This $\frac{1}{4}$ inch layer is composed solely of the finishing course mixture. None of the stony pieces from the binder course protrude through to the riding

surface. The composition of the binder course and the composition of the finishing course remain intact and are not mixed or blended. An inspection of the Exhibit demonstrates that the finishing course is bonded to the binder precisely in the same manner in which the latter is bonded to the base. None of the courses are mixed or blended. The binder course is bonded to the base and the top course to the binder course precisely in the manner always used in the prior art.

As Exhibit F I file herewith a specimen from the said Blackstone Avenue pavement, which specimen was taken up four months after the wearing surface was completed. An examination of this Exhibit shows that the distinctiveness of the finishing course has been maintained in actual service. The finishing course slightly exceeds the minimum $\frac{1}{4}$ inch thickness and is free from the stony pieces of the binder mixture. This specimen illustrates the wearing qualities of Type A pavement. The seal coat is perfect and the uniform distribution of the finishing course has prevented any tendency to wave and provided a smooth riding surface. The effectiveness of the uniformly distributed $\frac{1}{4}$ inch top finishing course in Type A construction as a seal coat for the entire structure is evidenced by the appearance of the same after a rain. I have observed that during the evaporation of the moisture from the surface of Type A after a rain, the color remains uniform, indicating that no moisture has been absorbed by the pavement. On the

other hand I have observed that during the evaporation of the moisture from the surface of Type B (the Wallace pavement) the color is streaked and irregular demonstrating that such pavement does absorb moisture. The surface of Type A also dries much more rapidly than that of Type B.

The photograph annexed hereto as Exhibit G is from a cross section of a specimen also removed from the Blackstone Avenue pavement on March 11, 1921, shortly after the same was completed. It also illustrates that in Type A pavement there is no blending of the binder and finishing courses, and that the two courses are distinct. The bonding of the two courses along a somewhat irregular line corresponds to that employed in the prior art, for example, compare Exhibit A to the affidavit of G. H. Perkins.

In addition to the aforesaid Blackstone Avenue job, the County of Fresno has contracted for the surfacing of other pavement with Type A specifications Exhibit 5 to the Bill of Complaint. This work is now in progress. The results are equally interpretative of the character of Type A construction. The photograph annexed hereto as Exhibit H is taken during actual laying of Type A upon Del Rey Avenue, Route 18, Fresno County. This photograph clearly indicates the extent of the compression of the binder course prior to spreading the finishing course in Type A construction. In the photograph A is the uncompressed binder course. B is the binder course after rolling. C is the uncompressed finishing course. D is the finishing course after rolling.

I have read the statement in the affidavit of the patentee Edwin D. Wallace filed herein as follows:

“By the preferred method of construction pointed out by the patent in suit the large mineral units of the lower layer are neither in close contact nor in fixed position relative to each other when the fine mixture is spread over the top, but are disposed loosely on the foundation. The pressure which brings the large units into close contact and bonds them together acts first on the fine mixture and tends to force it into the interstices of the upper portion of the layer of coarse mixture and at the same time it consolidates said layer by causing a change in the relative position of the particles of which it is composed.” (page 14)

This is directly the opposite of what occurs with Type A construction. In the latter the rolling of the binder course consolidates the same prior to the spreading of the finishing course. The constituents of the binder course are in close contact with each other and are not disposed loosely on the foundation when the finishing course is spread. Prior to spreading the finishing course the constituents of the binder course have assumed their final relative positions. This is shown to be the fact by an examination of the specimen constituting Exhibit I hereto. The latter is a section of binder course removed from Route 8, near Clovis, Fresno County. This is Type A construction and follows the identical specifications and represents

Type A binder course after compression and prior to the spreading of the finishing course.

In Type A the pavement is not densest at the top. As heretofore demonstrated Type A has a finishing course of $\frac{1}{4}$ inch minimum thickness free from any of the stony pieces of the binder course. This finishing course is composed of sand and bitumen. The aggregate of the finishing course is necessarily in fact of less density than the graded mineral aggregate of the binder course. The binder course as aforesaid is that of Patent No| 727,505 and pursuant to that patent contains less than 21% voids. The aggregate of the finishing course, being composed of a sand, necessarily contains a much higher percentage of voids. This is due to the elementary principle of physics that a solid is more dense than it will be when broken and that the more it is broken the less dense it is bound to be. The $\frac{1}{4}$ inch top layer of Type A is therefore of less density than the binder course. In verification of this statement I have had an analysis made of a specimen of Type A taken from the aforesaid Blackstone Avenue job on March 11, 1921. This specimen was presented by me to Smith-Emery Company, Testing Engineers, of Los Angeles, California, for analysis. Their analysis presented to me on June 23, 1921, states that the weight per cubic foot of the $\frac{1}{4}$ inch top coat of said Type A specimen is 133.6 lbs. and the weight per cubic foot of the 1- $\frac{1}{4}$ inch binder course is 154.8 lbs.

In conclusion I would remark that the idea of constructing a pavement of a base, a binder course of bi-

tumen and variable aggregate, and a top course of bitumen and fine aggregate, is much older than the Wallace patent in suit and has been the form taken by composition pavements for the past fifty years. These courses have always been bonded together by the cementing properties of the binder and top courses. The Wallace patent depends for novelty entirely upon spreading the top course prior to compression of the binder course. This is precisely what defendants have not done and do not wish to do. The Type A construction adopts the method in use long prior to Wallace of compressing the binder course prior to the spreading the top course. In my opinion a better construction is had thereby. There results a top layer ($\frac{1}{4}$ inch thick in Type A) which is not blended with the binder course. Therefore, the top layer contains no protruding stony pieces from the binder course and forms an effective seal. The individual rolling of the binder course produces a flat and comparatively smooth surface upon which the fine top mixture may be uniformly spread. The top course when compressed will therefore, be of uniform thickness and density. This course will not wave or ravel. The Type A pavement fundamentally differs from the Wallace pavement in that with Type A we do not have a single mass densest at the top, but have a composition pavement with distinct binder and top courses, the latter of less density and of greater plasticity than the binder course.

Chris P. Jensen

Subscribed and sworn to before me this 1st day of July, 1921.

Ben H. Johnson

Notary Public in and for
the County of Fresno,
State of California.

(Seal)

San Francisco, Cal., June 1, 1921.

I certify that the specification attached hereto is a true copy of Section 32 of Ordinance 240. prescribing general rules and standard specifications for street and sidewalk work and limiting the use of various kinds of pavements and sidewalks in the City and County of San Francisco, California.

W. J. Fitzgerald

Deputy Commissioner and Secretary
Board of Public Works.

Seal Department of
Public Works
San Francisco

San Francisco, Cal., June 1, 1921.

I certify that W. J. Fitzgerald is Deputy Commissioner and Secretary of the Board of Public Works of the City and County of San Francisco.

H. L. Mulcrevy

County Clerk

Seal Superior Court
City & County of
San Francisco, Cal.

EXHIBIT C

Affidavit of Chris P. Jensen.

ASPHALT PAVEMENT WITH A BINDER
COURSE

Section 32.

Asphalt pavement with a binder course shall consist of a concrete foundation at least six (6) inches thick, covered with an asphaltic concrete binder course one and one-half ($1\frac{1}{2}$) inches thick and an asphaltic wearing surface two (2) inches thick.

SUBGRADE: The area to be paved is to be excavated to the required depth for the construction of the pavement foundation. All perishable or otherwise objectionable material is to be removed from the subgrade and its surface is to be compacted by rolling or tamping, by using water, or by both watering and rolling. The rolling is to be done by a steam roller of a weight of not less than five (5) tons.

CONCRETE FOUNDATION: On this subgrade there is to be laid a concrete foundation at least six (6) inches thick, as hereinafter specified.

The concrete foundation is to be allowed to set seven (7) days, unless otherwise directed by the Board of Public Works, and its surface must be dry and swept clean before it is covered.

ASPHALTIC CEMENT: The asphaltic cement used for binder course and wearing surface must be prepared from California products. It shall be a natural asphalt, be a mixture of refined liquid asphalt with a solid asphalt or be an oil asphalt.

The asphaltic cement must be homogeneous and its consistency must fall within the limits of sixty-five (65) and eighty (80) degrees penetration by the District of Columbia Standard. It must be adhesive and ductile and also slightly elastic at a temperature of thirty-two (32) degrees Fahrenheit. When twenty (20) grammes are heated to a temperature of three-hundred (300) degrees Fahrenheit for eight (8) consecutive hours in an uncovered cylindrical dish three and one-half ($3\frac{1}{2}$) centimeters high by five and one-half ($5\frac{1}{2}$) centimeters in diameter, it must not lose more than five (5) per cent in weight and must not be so changed by such heating as to be made harder than of a consistency of twenty (20) degrees penetration by the District of Columbia Standard.

If a natural asphalt or a mixture of a refined liquid asphalt with a solid asphalt, it must, when ready for use, contain at least sixty (60) per cent of bitumen soluble in chloroform, and if an oil asphalt, it must, when ready for use, contain at least ninety-nine (99) per cent of bitumen soluble in chloroform and contain no free carbon.

When the asphaltic cement is prepared by mixing a solid oil asphalt with a liquid asphalt, the solid oil asphalt shall not be harder than of a penetration of sixty (60) degrees by the District of Columbia standard.

The refined liquid asphalt used in softening a solid asphalt must be a stiff residuum of petroleum oil with an asphalt base. It must be free from water and from

light oils volatile at less than two hundred and fifty (250) degrees Fahrenheit. When twenty (20) grammes are heated to a temperature of three hundred (300) degrees Fahrenheit for five (5) consecutive hours in an uncovered cylindrical dish three and one-half ($3\frac{1}{2}$) centimeters high by five and one-half ($5\frac{1}{2}$) centimeters in diameter, it must not lose more than five (5) per cent in weight. It must contain not less than ninety-nine (99) per cent of bitumen soluble in chloroform and must contain no free carbon.

BINDER COURSE: Upon the concrete foundation, the binder course is to be laid, which after compression, is to have a thickness of at least one and one-half ($1\frac{1}{2}$) inches. The binder course is to be composed of asphaltic cement and sound, hard rock, which must be clean and be so broken that all will pass a three-quarter ($\frac{3}{4}$) inch screen. Not more than ten (10) per cent of the broken rock shall exceed one and one-quarter ($1\frac{1}{2}$) inches in greatest dimension and not more than fifteen (15) per cent shall pass a ten (10) mesh screen. The asphaltic cement is to be heated to a temperature of between two hundred and fifty (250) and three hundred and fifty (350) degrees Fahrenheit before being mixed with the broken rock, and the broken rock when mixed with the asphaltic cement, shall be at a temperature of between two hundred and fifty (250) and three hundred (300) degrees Fahrenheit. These ingredients are to be thoroughly mixed in suitable appliances in such proportions that each particle of rock shall be thoroughly coated with a sufficient quantity of the asphaltic ce-

ment to bind the particles of rock firmly together when the mass has been spread upon the street and firmly compressed.

The binder course must contain at least five (5) per cent of bitumen soluble in chloroform.

Binder which appears dull from lack of cement or overheating or contains an excess of cement, will be rejected.

LAYING BINDER COURSE: The mixture of rock and asphaltic cement while still hot, shall be spread uniformly over the foundation with hot tools to such a depth that after compression it shall have a thickness of at least one and one-half ($1\frac{1}{2}$) inches. It shall be immediately rolled with a steam roller weighing not less than one hundred and fifty (150) pounds to the inch width of roller. This rolling shall be continued while the binder is in a hot, plastic condition. Such portion of the binder course as it may be impossible to roll shall be thoroughly rammed with hot tampers. The upper surface of the binder course shall be made parallel with the required surface of the finished pavement, and the particles of rock in the whole course, when finished, must be firmly bound together.

ASPHALTIC WEARING SURFACE: Upon the binder course shall be laid an asphaltic wearing surface, composed of asphaltic cement, sand and stone dust, and the materials must be mixed in such proportions that the percentage composition (by weight) of the wearing surface shall be within the following specified limits:

COMPOSITION OF WEARING SURFACE.

(1) Bitumen soluble in chloroform, between 9 per cent & 13 per cent.

(2) Sand, stone dust, and other inorganic ingredients,

Passing Rejected

Screen by Screen of

Mesh No. Mesh No.

200	...	between 13 per cent and 18 per cent
100	200	between 10 per cent and 18 per cent
80	100	between 6 per cent and 18 per cent
50	80	between 16 per cent and 36 per cent
30	50	between 13 per cent and 29 per cent
20	30	between 5 per cent and 9 per cent
10	20	between 3 per cent and 6 per cent

At least six (6) per cent. and not more than eighteen (18) per cent. of these ingredients shall be stone-dust.

STONE DUST FOR WEARING SURFACE: The stone dust shall be pulverized limestone or Portland Cement. All of it must pass a fifty (50) mesh to the inch screen, and at least sixty (60) per cent. must pass a two hundred (200) mesh to the inch screen.

SAND FOR WEARING SURFACE: The sand must be clean, hard and sharp. It must all pass a ten (10) mesh to the inch screen and must not contain more than three (3) per cent of mica, clay or other inferior ingredients.

PREPARATION OF THE WEARING SURFACE MIXTURE: The asphaltic cement and the

sand are to be heated separately in suitable appliances to a temperature of not less than two hundred and fifty (250) degrees nor more than three hundred and fifty (350) degrees Fahrenheit, and the stone-dust is to be added to and mixed with the hot sand just before the asphaltic cement is added. The mixing of all ingredients is then to be continued within the temperature limits above indicated until every particle of sand and stone-dust is thoroughly coated with asphaltic cement.

LAYING THE WEARING SURFACE:

The wearing surface mixture shall be brought to the work in suitable carts or dump wagons and shall not be colder than two hundred and fifty (250) degrees Fahrenheit when it reaches the street. It is to be uniformly spread over the binder course with hot shovels and rakes, to such depth that, after ultimate compression, the finished surface shall not be less than two (2) inches thick.

After being spread, the mixture shall at once be compressed with hand rollers weighing not less than two hundred and fifty (250) pounds to the foot width of roller. These shall be immediately followed by a steam roller having a weight of between one hundred and twenty-five (125) pounds and one hundred and fifty (150) pounds to the inch width of roller, after which, while the pavement is still hot, it shall be rolled with a steam roller having a weight of not less than two hundred and fifty (250) pounds to the inch width of the roller.

The steam rolling is to be done by first running the roller across the roadway at right angles to its direction, then crossing diagonally first from one side and then from the other, the direction of the two diagonal rollings being approximately at right angles to each other, and finally by rolling parallel with the direction of the street.

The rolling with the steam roller shall be continued for not less than five (5) hours for every thousand (1000) square yards of surface. Such portions of the wearing surface as it may be impossible to roll shall be thoroughly rammed with hot tampers and smoothed with hot smoothing irons, care being taken not to burn the surface.

A small amount of hydraulic cement or infusorial earth is to be swept over the pavement after the rolling.

The finished surface must be smooth and conform with the prescribed surface of the roadway. When a straight edge ten (10) feet long is laid on the finished surface of the roadway and parallel with a line of the street, the surface shall in no place vary more than one-fourth ($\frac{1}{4}$) of an inch from same.

No asphaltic wearing surface or binder course shall be laid in rainy weather or when the binder surface or concrete foundation is wet, as amended by Ordinance No. 1415, approved February 15, 1905.

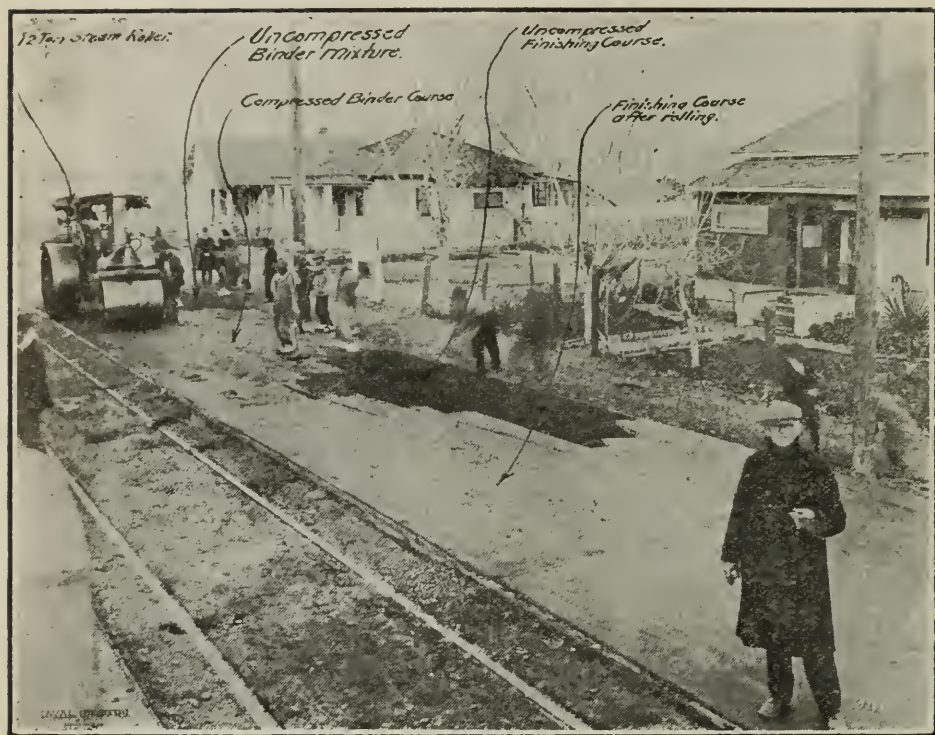


EXHIBIT D.
Affidavit of Chris P. Jensen.

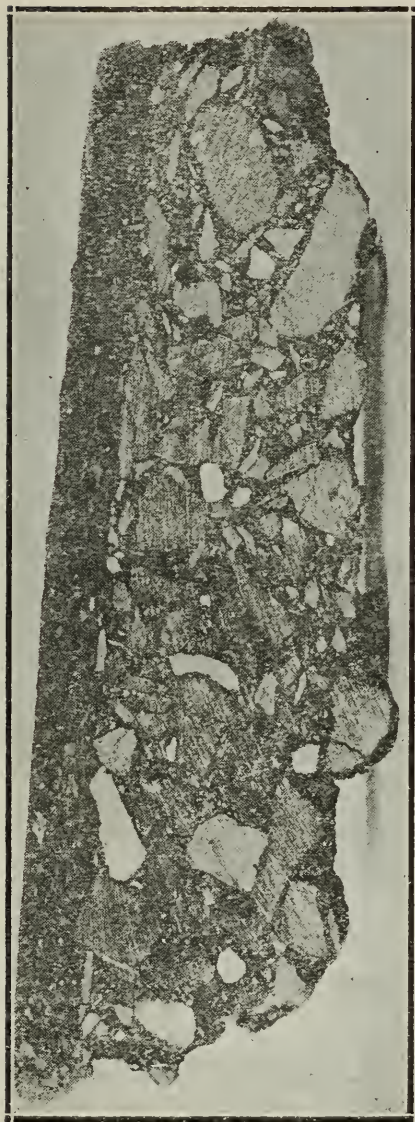


EXHIBIT G.
Affidavit of Chris P. Jensen.



EXHIBIT H.

Affidavit of Chris P. Jensen.

[Endorsed]: Received copy of the within this 5th day of July, 1921 Paul S. Honberger Sol for Plaintiff By M. M. W.

FILED JUL 5 1921 CHAS N. WILLIAMS, Clerk
By Edmund L. Smith Deputy Clerk

Stipulation dated September 7, 1921 relating to introduction of certain exhibits and also stipulating certain facts.

[TITLE OF COURT AND CAUSE.]

STIPULATIONS.

It is hereby stipulated by and between counsel for the parties above named:

1. That the usual printed or photostat copies of United States and foreign patents may be received in evidence with the same force and effect as duly certified copies thereof, subject to correction if error be made to appear.

2. That the book entitled "Modern Asphalt Pavement, by Clifford Richardson, First Edition, Copyright, 1905" may be received in evidence in the above cause without proof of publication, and that said book was printed and published in the United States in 1905 and duly copyrighted in that year.

3. That the specifications constituting Exhibit C to the affidavit of Chris. P. Jensen on file herein may be received in evidence without further proof of their authenticity other than the certificate annexed to said exhibit, and that said specifications were adopted by the City and County of San Francisco in 1905 by Section 32 of Ordinance 240.

4. That complainant is a corporation organized under the laws of the State of West Virginia, and formal proof of this fact is waived.

5. That the typewritten copy of the assignment made by E. C. Wallace, the patentee, to plaintiff, Warren Brothers Company, of said U. S. Letters Patent No. 959976, attached as an exhibit to the bill of complaint in this cause, may be used as evidence in this

case, and that formal proof of the execution of said assignment or the registration thereof is waived.

6. That the trial of this case, which has been set for hearing on the 27th day of September, 1921, may be postponed and the trial thereof fixed for the day of October, 1921.

7. That specifications Nos. 1 and 2 as presented by the County Surveyor for "part of Route 5, Section A" Fresno County Highway System on the 27th day of September, 1920, were duly approved and adopted by the County of Fresno, and that the pavement laid for part of Route 5, Section A of the Fresno County Highway system was laid under said specifications and in accordance therewith.

8. That Exhibit No. 3 to the bill filed in this case is a correct copy of the license mixture agreement filed by plaintiff with the County of Fresno on October 1, 1920, and that the same now is and has been on file with said County since that time.

Los Angeles, California September 7, 1921.

J. M. Head

Paul S. Honberger

Everts, Ewing & Wild.

Attorneys for Plaintiff.

Frederick S. Lyon.

Leonard S. Lyon.

Attorneys for Defendants.

[Endorsed]: FILED FEB 20 1923 CHAS. N. WILLIAMS, Clerk, By R. S. Zimmerman Deputy Clerk

[TITLE OF COURT AND CAUSE.]

DEPOSITIONS OF

Charles S. Ashley

Arthur A. Adams

Jacob A. Courtade

COMMONWEALTH OF MASSACHUSETTS)
COUNTY OF SUFFOLK)ss.

In the City of Boston, County of Suffolk, Commonwealth of Massachusetts, Charles S. Ashley, Arthur A. Adams and Jacob A. Courtade, witnesses called in behalf of the Plaintiff herein, all residing more than one hundred miles from the place where the trial of this action will occur, being duly cautioned and sworn to testify the whole truth, and being carefully examined, depose and say as follows:

PRESENT: James M. Head as Attorney for Plaintiff and L. G. Miller as Attorney for Defendants.

Direct Examination by Mr. Head.

Q. 1. State your name, residence and occupation.

A. 1. Charles S. Ashley, 93 State Street, New Bedford, Mass., Banking, Real Estate, Insurance. 63 years of age.

Q. 2. Do you hold any official position in the City of New Bedford? If so, what is it?

A. 2. Yes, Mayor.

Q. 3. How many years have you served as Mayor of New Bedford and when were you first elected?

A. 3. 22 years as Mayor. Elected in the fall of 1890.

Q. 4. What years have you occupied as Mayor since that time.

A. 4. Served 1891; 1892; 1897; 1898; 1899; 1900; 1901; 1902; 1903; 1904; 1906; 1909; 1910; 1911; 1912; 1913; 1916; 1917; 1918; 1919; 1920; 1921.

Q. 5. During the time that you were Mayor of the City, did you keep in touch or were you familiar with the nature and character of street pavements laid during those years?

A. 5. Yes.

Q. 6. Were you acquainted with Frederick J. Warren? If so, when did you first know him?

A. 6. I first became acquainted with him in 1901;

Q. 7. Were any pavements laid in the City of New Bedford during the year 1901 under any patents or specifications which F. J. Warren claimed? Objected to by Mr. Miller.

As calling for a conclusion of law in the construction of patents and also as a matter of opinion when by order of the court expert testimony directed to matters of opinion in this suit is embodied in affidavits which were to be filed within a limited time.

A. 7. Yes.

Q. 8. On what streets were those pavements laid?

A. 8. On fifth St. Pleasant St., I think Market St.

Q. 9. State how the pavement referred to during the year 1901 was constructed.

A. 9. Mr. Warren had a method of construction of large stone put down and rolled and then a mixture put to it when it was in its original cold state that was

stated to him to be made to fill voids thereby filling it up from bottom to top and what he called a squeegee top on that one method; the other method was to put in fine screenings to fill the voids of the top; done under a cold process.

Q. 10. This top course to which you refer was laid how thick?

A. 10. $\frac{1}{2}$ " thick.

Q". 11. Which method of the top finish was first used in the City of New Bedford? That is, the squeegee coat or the mixture of fine material and asphalt.

A. 11. I can answer that from layman's point only. I designate one as a soft and the other as hard. Squeegee was merely the tar pushed over with a window pusher; that was a hard top; the other was soft, pliable. We used what we call the soft top first. That did not go.

Q. 12. Were those tops laid after the lower coarse stones had become cool.

A. 12. Yes.

Q. 13. Do you state that in the first construction used the soft top was employed. Did that prove satisfactory or not.

Q. 13 No, sir.

Q. 14 What was done after that.

A. 14 It was taken out the next year and the squeegee was put in, was used. From Pleasant St. and Fifth St.

Q. 15 Do you mean by the squeegee the hard top surface.

A. 15 Yes, sir

Q. 16. Was that form of construction adopted by the subsequent work done in New Bedford. If so, how long was it in use.

A. 16 Yes, up to 1910 or 1911.

Q. 17. Are you *acquainted* with Edwin C. Wallace. If so, how long have you known him.

A. 17 Yes, known him since 1910.

Q. 18. Did Mr. Wallace at any time make an application to you for the construction of street pavement in your city under any patents obtained by him? If so, when was it and what was done?

Objected by Mr. Miller. Same objection as the previous one.

A. 18 He did in 1910.

Q. 19. What was the character of construction which he recommended, and if his recommendations were adopted, what was done?

A. 19. He showed to me in 1910 a construction under his patent whereby this mixture was made and put on and driven through when hot with a hard finish. I did not take kindly to it. Experience I had had before rather frightened us, and we refused at that time to contemplate it, until Mr. Warren himself guaranteed to the city that if it was not successful after laying a piece they would be responsible, and would put down a piece that would be satisfactory.

Answer objected to by Mr. Miller.

We tried that experimental section on Cove St. Very positive that it was 1910. That is there now.

Mr. Miller: Answer objected to as involving a conclusion of law as to whether the pavement was constructed in accordance with the patent or no.

Q. 20. Was *this* pavement laid under Mr. Wallace's supervision and direction?

A. 20. Yes,

Q. 21. What character of traffic has this pavement been subjected to since it was laid?

A. 21 It is a street leading direct to our mills which takes the heaviest traffic we have, both in the moving of machinery and cotton.

Q. 22. Have any repairs been made to this street since that time?

A. 22. None other than a cut where a sewer *when* through the street, outside of that none.

Q. 23. What has been done by the City of New Bedford since that time in laying additional streets under the Wallace construction and patents?

Objection by Mr. Miller.

Same objection by Mr. Miller.

A. 23. We have laid it about every year since.

Q. 24. Could you state in round numbers about how much pavement has been laid under Wallace patent since that time?

A. 24. I can't give the full amount; we laid 147,000 yards this year. I think about 100,000 last year; the total amounts I couldn't give. Average 60,000 up every year.

Q. 25. I show you herewith typewritten statement giving the names of the streets, the area of square

yards of pavement laid under the Warren patent with the flushcoat and stone chips finish covering the first two pages, and another statement of pavements laid during the years 1910 and 1921 in your city giving the streets, area, and also a summary of the pavements laid in your city between the years 1901 and 1921 showing the area using the flushcoat surface, the area in which the fine chips were used, and the percentage of each kind of pavement laid during each of the years named. Please examine the same, and if correct will you file it as Exhibit No. 1. with your deposition in this case showing the pavement laid in your city during the years named.

Objection of Mr. Miller.

Objected to as leading and also because the figures are unauthenticated, and by witness' own statement it is unable to give from memory correct figures, and because the statement involves conclusions of fact and of law as to the character of the pavements laid and is couched in descriptive terms undefined by the witness.

A. 25. That seems to be correct, and I file it as Exhibit No. 1.

Q. 26. I show you map of the City of New Bedford, Mass. with marks in black indicating the streets paved under the Warren patents, and marks in red indicating the streets paved under the Wallace patents, and ask you if this map correctly represents the various streets paved in your city referred to in your Exhibit No. 1. If so, will you file the same as Exhibit No. 2. of this deposition.

Objection by Mr. Miller.

I Object to this as leading, and including conclusions of law and calling for statements of opinion.

A. 26. With the exception of the map not being long enough to take in the whole of New Bedford, where work has been done north of the city at the right edge of the map and south of the city at the left edge of map, I file the same as Exhibit No. 2. of my deposition.

Q. 27. In reference to the pavements laid, under the Warren patents with the flushcoat surface finish, have these pavements proven satisfactory or not?

Objected to by Mr. Miller as involving conclusions of law.

A. 27. No, sir, they have not proved satisfactory.

Q. 28. In what respects have they proven unsatisfactory.

A. 28. In cases it would wear off leaving the stone exhibited then would crumble and we would have to put in another surface to bond it; it would also crawl at certain points have to be taken out and the tops of those stones if not resurfaced quick enough would be like pieces of petrified ginger bread.

A. 29. What was done as the result of these defects.

A. 29. They were patched, resurfaced; painting of tar put on, leaving not only disfigurement but around a circle would leave it so that it would start again at those edges.

Q. 30. What has been the result of the pavements laid under the Wallace construction since 1910?

A. 30. We never have repaired or had occasion to repair any of the work done under that patent only in two cases. One is when it is cut into for sewerage or other work, and when it has been laid close to a railroad where the construction was light and would give motion to the tracks would affect the pavement.

Q. 31. Do you know of your own knowledge whether the Warren Brothers Company have endeavored to promote the construction of street pavement under the Wallace patent in cities other than the City of New Bedford prior to the year 1920? If so, what information have you upon the subject.

Objection by Mr. Miller. As calling for a conclusion of law of interpretation of the patent and also as indefinite.

A. 31. I have received letters from other cities over the country requesting our opinion as to the value of the pavement which I received a number of.

Q. 32. During what years have you received letters of this kind?

A. 32. I think from 1912 up I have received them about every year.

Q. 33.

CROSS EXAMINATION BY MR. MILLER.

Cross-examination waived.

DEPOSITION CLOSED.

Chas S Ashley

EXHIBIT #1.

Deposition of Charles S. Ashley.

Robert Fowler, Notary Public. (Seal)
NEW BEDFORD, MASS.

Streets laid 1901 to 1911 inclusive with the Bitulithic Pavement using Liquid Flushcoat and stone chips:

Commission Expires March 7, 1924
ROBERT FOWLER, Notary Public

Street	From	To	Area Sq. yds.
1901			
<u>Fifth</u>			
Fifth	Madison	Russell	1670
Market	Spring	Union	575
Pleasant	Pleasant	Sixth	668
	Weld	Austin	1513
1903			
<u>Pleasant</u>			4426
Pleasant	Elm	Maxfield	5240
	Linden	Austin	1406

Second Beetle and Front	Union Acushnet Ave.	School Holly	1324 2600
1904			<hr/> 10570
Pleasant Sycamore William Elm Water Second Fifth Sixth	Maxfield Pleasant Pleasant Purchase Union School Spring Union	Common) 110' W) Sixth Sixth William Cannon Walnut William	4072 454 1150 1047 3673 1983 851
1907			<hr/> 13230
Pleasant Pleasant Middle So. Second	Austin Elm Pleasant Griffin	Pearl William Purchase South	5837 1198 550 5216
1908			<hr/> 12801

Pleasant Bedford	Union Sixth	William Orchard	1376 2448
1910			<hr/> 3824
No. Front	Holly	Belleville	11773
1911			<hr/> 11773
Acushnet Ave. Fifth	William Walnut	Dover Madison	341 842
Coggeshall First	Acushnet Ave. Division	Fairhaven Bridge Cove Road	9001 1519
Bowditch	Present Block Pav.	Nash Road	15535
Acushnet Ave. William	Hicks Sixth	Logan Pleasant	639 596
Pleasant Market	Market Pleasant	William Sixth	140 119
Sixth N. E. Corner of William and Pleasant	Union 6th Streets William	William Elm	483 20 295
			<hr/> 29500
		Total 1901 to 1911 inclusive	86124

NEW BEDFORD, MASS.

Streets laid 1912 to 1921 inclusive with Bitulithic Pavement using Liquid Flushcoat and stone chips:

Street	From	To	Area sq. yds.
1912:			
Bedford			
Sixth	Acushnet Ave.	Sixth	1139
First	William Division	Elm	692
		Blackmer	2728
1913:			
Acushnet Ave.			4559
First	Tallman Rivet	Nash Road	9051
		50' to joint)	
		of pavement)	133
		laid 1911)	
			9184
		Total 1912 to 1921 inclusive	13743

NEW BEDFORD, MASS.

Streets laid 1910 to 1921 inclusive (————) with pavement using Fine Surfacing Mixture:

Street	1910 —		Area sq. yds.
	From	To	
Cove	Water	So. First	874 <hr/> 874
Ash Court Fairhaven Bridge (S. side) Mechanics Lane	Union County Draw Sixth	Court Cottage Main St. Fairhaven Pleasant	680 1982 16394 328 <hr/> 19384
Court Union	Cottage Sixth	Ash Ash	1793 5721

1917

Summer Mill	Elm	Kempton County	1373
Sixth	Summer Grinnell	Spring South	784
Acushnet Ave.	"	Brock Ave.	7695
W. French Av.	Cove	Union	1042
Cottage	Arnold	Lund's Cor.	3346
Acushnet Ave.	Nash Rd.	Holly	1638
"	Sawyer		28816
Dartmouth Mfg. Co. Mill Yard			494
			1164
			<hr/> 46352

Continued

No. 2 of 3 sheets.

Area
sq. yds.

Street	From	To	
Cove	S. First	County	3169
Cedar	Kempton	Durfee	12243
Grinnell	Water	Crape	3355

1918

Cove	2686
Chauncey	1427
Cottage	1249
Railroad	10665
Bolten	6055
Sawyer	15532
	<hr/>
	56381

1919

Gifford	Acushnet Ave.
Ash	County
Summer	Willis
Acushnet Ave.	
County	
Willis	

Rivet	9345
Water	7959
Rivet	3112
120' E of Church	300
Coffin Ave	1550
Quansett	600
Deane	4565
Rotch	3013
Coffin Ave.	6487
Kempton	3480
Belleville Ave.	6540
Arnold	2330
Cottage	2746
Acushnet Ave.	1882

Orchard	Brook Ave.
Cove	E. French Ave.
Acushnet Ave.	South
Coffin Ave.	Quansett
Quansett	Deane
Deane	Purchase
Purchase	Sawyer
Arnold	Atlantic
Belleville Ave.	Sawyer
Cottage	Union
Belleville Rd.	Acushnet Ave.
Cottage	Hawthorne
Hawthorne	County St.
Cedar Grove Ave.	Purchase

Gifford	Harber	Mill Gate	1610
St. James Church			483
Orchard	Court	Union	620
Hawthorne	Brigham	Rotch	(
Rotch	Arnold	Hawthorne	(6436
Brigham	Hawthorne	Allen	(
			<hr/>
			63068
			<hr/>
			1920
			<hr/>
			<hr/>
Russell	Acushnet Ave.	Sixth	1697
Cannon	S. Water	Acushnet Ave.	1440
Cottage	Dartmouth	Hawthorne	4217
Hawthorne	Tremont	Brigham	1348
Rotch	Arnold	Court	3006
Sycamore	W of Pleasant	County	2425
Purchase	Weld	Sawyer	6982
Deane	Acushnet Ave.	300' W	1016
Church	Coffin Ave.	Nash Rd.	6365
Sawyer	Acushnet Ave.	N. Front	917
Kenyon	Acushnet Ave.	N. Front	2027
Bullard	Acushnet Ave.	Wendef	3553
Cottage	Kempton	Parker	6935
Linden	Purchase	Pleasant	717
Arnold	Orchard	Ash	2771

Continued

Street	From	To	No. 3 of 3 sheets	
			Area	sq. yds.
1920 continued:				
Breck	Matt	Emma		1187
S. First	Rivet	Howland		5351
Meshier	County	Crape		3370
Winsor	"	"		3143
Independent	"	"		2738
Emerson	Arnold	Union		1646
Meshier, Winsor and				
Katherine	County	Crape		2966
Dartmouth Mfg. Co.				5948
Ash	Union	Arnold		1278
				<hr/>
			1921	73043
			<hr/>	
Coffin Ave.	^{side} River	Belleville		8638
Coffin St.	road Water	Second		981

Sawyer	Mill entrance	Front	4365
Second	South	Rivet	3337
Rivet	Bolten	Dartmouth	3319
Grinnell	Water	Prospect	919
Belleville	Coffin	Hathaway	5705
Cottage	Parker	Durfee	7977
Breck	W. French	Emma	7359
Allen	County	Green	1073
Cedar Grove	Belleville	Acushnet	2852
Hawthorne	Rotch	Rockdale	4854
Ash	Kempton	Court	2445
Foster	Middle	Kempton	902
Park	Kempton	Parker	8306
Hemlock	Rockdale	Rockland	10314•
Cedar	Court	Kempton	2827
West French	Warren	Lucas	10838
Nash Road	Railroad Crossing	Mt. Pleasant	3592
High	Purchase	Foster	797
Church St.	Laurel	Shaw	3023
Central Ave.	Church	King	496
Bowditch	Nash Rd.	Acushnet	31613
Mt. Pleasant	R. R. Crossing	Nash Rd.	1802
		Total for 1921	<hr/> 128134

NEW BEDFORD, MASS.

Pavement laid using Liquid Flushcoat and stone chips:

Pavement laid using Fine Surfacing Mixture:

Year laid	Area using Flushcoat Sq. Yds.	Area using Fine Sur- facing mix Sq. Yds.	Total During year	Area in % of Total	
				Using Flushcoat	Using Fine Surfacing Mixture
1901	4426	....	4426	100%	.....
1903	10570	....	10570	100%	.....
1904	13230	....	13230	100%	.....
1907	12801	....	12801	100%	.....
1908	3824	....	3824	100%	.....
1910	11773	874	12647	93%	7%
1911	29500	....	29500	100%	.....
1912	4559	19384	23943	19%	81%
1913	9184	16250	25434	36%	64%
1914	....	41136	41136	.....	100%
1915	....	426	426	.....	100%
1917	....	46352	46352	.....	100%
1918	....	56381	56381	.....	100%
1919	....	63068	63068	.....	100%
1920	....	73043	73043	.....	100%
1921	....	128134	128134	.....	100%
Totals	99867	445048	544915	19%	81%

JACOB A. COURTADE a witness for the Plaintiff, being sworn stated as follows:- (Mr. Head questioning)

Q. 1. State your residence and occupation.

A. 1. 135 Arcadia Avenue, Bridgeport, Connecticut. Assistant Director of Public Works, 1903-1910; Director of Public Works since that time.

Q. 2. Has it been a part of your duty as Director of Public Works in the City of Bridgeport to have the charge and control of street construction in that city?

A. 2. Yes, sir.

Q. 3. When was the form of construction of street pavement under the F. J. Warren patent first brought to your attention.

A. 3. Some years ago.

Objection by Mr. Miller. Objected to as indefinite and as calling for conclusions of law and matters of opinion.

Q. 4. When did you first know of pavement being constructed under the Warren patents in the City of Bridgeport?

Same objection by Mr. Miller.

A. 4. 1910.

Q. 5. When was your first experience in the construction of pavements under the Warren patent.

A. 5. 1913.

Q. 6. When was the construction of pavements under the Wallace patent first brought to your attention?

Same objection by Mr. Miller.

A. 6. 1915.

Q. 7. Did the method of construction provided for by the Wallace patent appeal to you as better in any way than the methods previously in use, and provided for by the Warren patent? If so, in what respects?

Objected to by Mr. Miller as indefinite as it does not appear what methods are referred to and also as leading.

A. 7. The first information received from Warren Brothers Company providing for the use of the Wallace patent I objected to. After much talk and being convinced by Warren Brothers that they would assume all responsibility I consented to the use of the Wallace patent.

Q. 8. Has the City of Bridgeport laid any pavements in accordance with the Wallace construction? If so, how much?

Objected to by Mr. Miller as calling for conclusions of law and statements of opinion.

A. 8. Over 1,000,000 square yards.

Q. 9. When did the City of Bridgeport make the change from the form of construction under the Warren patent to that adopted by the Wallace patent?

Same objection by Mr. Miller.

A. 9. About July 1st, 1916.

Q. 10. I hand you herewith a statement showing the pavements laid in the City of Bridgeport for the years 1913 to 1920 inclusive. The amount of pavement laid with the use of the flushcoat method, and

the amount of pavement laid by using fine surfacing mixture. This statement also shows total area laid during these years, and the percentage of each kind of pavement laid. If this statement is correct, will you file the same as Exhibit No. 1 of your Deposition?

Objection by Mr. Miller. Question is objected to as leading, the statement is objected to as unauthenticated, and as calling for secondard recollection when the witness' final recollection has not been tested. It is also objected to as indefinite, as it is couched in terms not defined, and not shown to be understood by the witness.

A. 10. I will.

Q. 11. I hand you herewith a map of the City of Bridgeport with the several streets in that city marked with black ink as indicating pavement laid under the Warren type of construction, and red mark indicating the pavement laid under the Wallace type of construction. Does that map correctly represent the pavements referred to in answer to your previous question. If so, will you file the same as Exhibit No. 2. of your Deposition?

Objected to by Mr. Miller as leading and as calling for conclusions of law and matters of opinion.

A. 11. I will.

Q. 12. During your official connection with the City of Bridgeport, what has been the result of your observation as to the durability of the two kinds of pavement construction referred to?

Objected to by Mr. Miller as indefinite, as the only definitions of the two kinds of pavements referred to

are vague, and uncertain, and involve questions of law and matters of opinion.

A. 12. The Warrenite pavements flaked and require new coating, a squeegee coat; also in places some skim coating. Under the Wallace patent we have never had occasion to make any repairs; are in very good condition at the present.

Q. 13. Have any of the pavements laid under the Wallace construction developed any bumps, rolling or shoving in the surface mixture?

Same objection by Mr. Miller.

A. 13. None, excepting where water-breaks have occurred. That is, where water pipes burst.

Q. 14. Has the surface mixture of the pavement under the Wallace construction *pealed* off or worn off by ordinary use?

A. 14. It has not; is a solid mass, did not show any scaling.

Q. 15. In your official capacity as ^{Director}~~Inspector~~ of Streets in the City of Bridgeport, have you had occasion to examine the streets referred to from time to time and if so, in what condition have you found them?

A. 15. Very good excepting where repairs are to be made for excavations which have been necessitated by new buildings requiring gas, sewer, and water connection.

CROSS EXAMINATION BY MR. MILLER.

X.Q. 1. All the pavements concerning which you

have been testifying embody on the foundation of the road a layer of substantial thickness which is composed of a homogeneous mixture of stones and stone

all particles of various sizes, ~~are~~ bonded together by asphalt, and on which a surface coat whether what you have called a squeegee coating or a fine surfacing mixture is laid, do they not?

X.A. 1. Yes.

X.Q. 2. Will you please describe the method of applying a squeegee coating to such a layer.

X.A. 2. The squeegee method of Warrenite consists of laying a course of inch stones coated with a bituminous mixture, and laid while it is hot, (JAC) then another layer of smaller stones was put on top of the larger stones, also coated with bituminous material, each course having been rolled thoroughly previous to placing the second coat. After this was completed, the top then was coated with bituminous asphalt, also hot. The second method referred to as Seal Coat consisted of applying a layer of stone, rolling it, and then applying seal coat rolling all this mixture solid so that no voids appear after finish.

X.Q. 3. Do I understand from your answer that underneath the layer called Squeegee Coat and above

way the foundation of the road ~~work~~ (JAC) there were two layers of stone separately rolled, the lower being of inch stone, and the other of smaller stone?

X.A. 3. Simply to fill voids.

X.Q. 4. Then did each layer as it was spread on

the road ^{way} ~~work~~ (JAC) consist of stones of substantially the same size?

X.A. 4. The top coat was smaller size. Not as the first layer.

X.Q. 5. Quoting your answer to X.Q. 2, you say that the method "consists of laying a course of inch stone coated with a bituminous mixture." What I mean is are all the stones in this layer substantially an inch in size?

X.A. 5. No, as inch stone in this territory, we know as 1-1/2" in Bridgeport.

X.Q. 6. Then the stones in this course were substantially of inch and a half size?

X.A. 6. The lower course with inch and a half stone.

X.Q. 7. About how thick is this course.

X.A. 7. I should say approximately 4".

X.Q. 8. This course was rolled?

X.A. 8. Yes.

X.Q. 9. How large were the stones in the course of finer stones which was laid on top?

X.A. 9. Half inch.

X.Q. 10. How thick was this course?

X.A. 10. 2".

X.Q. 11. The squeegee then consisted of a layer of hot asphalt spread on top of this?

X.A. 12. Some bituminous material was mixed in with this half inch stone thereby requiring the use of the squeegee method to seal the voids.

X.Q. 13. But the squeegee coating proper which

went on after the half inch stone course which was mixed with asphalt had been laid consisted of asphalt spread or flooded over the half inch course?

X.A. 13. Yes.

X.Q. 14. Was mineral matter ever mixed with this squeegee coating?

X.A. 14 No.

X.Q. 15. The kind of pavement which you have just described was that laid under your supervision in Bridgeport in the year 1913, 1914 and 1915?

X.Q. 15. Yes.

X.Q. 16. I quote from your answer to X.Q. 2: "The second method referred to as Seal Coat consisted of applying a layer of stone, rolling it, and then applying seal coat, rolling all this mixture solid so that no voids appear after finish." Does this layer of stone refer to the layer of half inch stone which you have just described?

X.A. 16. No, it did not.

X.Q. 17. Were the layers of inch stone and half inch stone present in the roadway?

X.A. 17. No, they were mixed in with the lower course.

X.Q. 18. Please describe the layers present in the roadway having regard to the size of the stones as they are spread upon the foundation in the Seal Coat method.

X.A. 18. The larger stones were spread and rolled first, then the seal coat applied on that.

X.Q. 19. What was the size of these larger stones and how thick a layer did they make?

X.A. 19. 6" thick. In variance of what you call inch and half stone and what I call it. I would call it 2" stone.

X.Q. 20. 2" stone means a stone about an inch and half in diameter if measured with a foot rule?

X.A. 20. It means what would pass through a 2" ring.

X.Q. 21. This layer was rolled?

X.A. 21. First layer? Yes, sir.

X.Q. 22. With how heavy a roll.

X.A. 22 10 to 12 ton.

X.Q. 23. What was the composition of the seal coat placed on top of this layer, and how thick was it?

X.A. 23. 2" thick; not qualified to state the mixture at all.

X.Q. 24. This seal coat was applied after the lower layer had been rolled?

X.A. 24. Yes.

X.Q. 25. The seal coat method which you have been describing is the one used in Bridgeport for pavements constructed under your supervision? in the last five years?

X.A. 25. Yes, sir.

CROSS EXAMINATION CLOSED.

RE-DIRECT EXAMINATION BY MR. HEAD

R.D.Q. 1 I show you herewith a contract dated May 5th, 1915, signed by you as Director of Public Works for the City of Bridgeport, and attached thereto specifications under which the pavement contracted for was laid. Ask you if that is your signature.

R.D.A. 1. Yes.

R.D.Q. 2. I will ask you if the following statement is contained in and is a part of the specifications under which that pavement was laid: "Upon the rolled surface there shall be spread by suitable spreading machine enough of the Warren flushcoat composition to fill all superficial voids. Upon the flushcoating fine gravel or sand or stone screenings shall be spread in sufficient quantity to cover the flushcoating. Each layer of the work shall be kept as free as possible from dirt so that it will unite with the succeeding layer." I will ask you if the pavement referred to was laid in conformity with those specifications.

R.D.A. 2. Yes, sir.

R.D.Q. 3. Does the foregoing quotation which I have just read correctly describe the method of surface finish pavements laid in Bridgeport, Conn. prior to July 1st, 1916?

R.D.A. 3. Yes, sir.

R.D.Q. 4. I show you another contract dated the 31st day of May, 1916, signed by you as Director of Public Works and ask you if that is your signature, and if the pavements laid were in accordance with the specifications attached thereto?

R.D.A. 4. Yes.

R.D.Q. 5. I will ask you if the following quotation from the specifications of this contract correctly describe the pavement laid in accordance therewith, "There shall be spread over the Warrenite surface

mixture a seal coat using per square yard of Warrenite road approximately $\frac{1}{4}$ th gallon of Warrenite cement into which shall be incorporated approximately 25 lbs. of mineral aggregate not larger than $\frac{1}{4}$ th" diameter. After spreading the seal coat, it should be thoroughly rolled into the Warrenite surface mixture. On grades a coarser aggregate may be used." Was the pavement covered by this contract laid in accordance with the requirements of the specifications.

Objected to by Mr. Miller as leading, as the witness has already stated that he is unable to tell the composition of the seal coat layer, and also as indefinite as the description read includes trade terms descriptive of a material of unknown character.

R.D.A. 5. Yes, sir.

R.D.Q. 6. Does the quotation just read correctly describe the method of surface finish on pavements laid in Bridgeport, Conn. on all streets laid by Warren Brothers Company from July 1916 to the present time?

R.D.A. 6. Yes, sir.

RE-DIRECT EXAMINATION CLOSED

Jacob A. Courtade

DEPOSITION CLOSED.

Exhibit #1
Deposition of Jacob A. Coutade
Robert Fowler Notary Public
Commission Expires March 7, 1924
ROBERT FOWLER, Notary Public

BRIDGEPORT, CONN.

Year laid	Area using Flushcoat	Sq. Yds.	Area using Fine Surfacing Mixture	Total Area laid during year	Area in % of Total using Flush Coat	Area in % of Total using Fine Surfacing Mixture.
1913		71145		71145	100%	..%
1914		11825		11825	100%	..%
1915		220387		220387	100%	..%
1916		13804	276910	290714	5	95
1917			373077	373077	...	100
1918			55790	55790	...	100
1919			253075	253075	...	100
1920			157409	157409	...	100
Total	317161		1116261	1433422	22%	78%

DIRECT EXAMINATION OF ARTHUR A. ADAMS BY MR. HEAD

Q. 1. Give residence and occupation.

A. 1. Springfield, Mass. Treasurer Adams & Ruxton Construction Company.

Q. 2. Did you ever hold any official position in the City of Springfield and if so, what was it?

A. 2. I was Supt. of Streets between 1899 and 1911. Mayor years 1919, and 1920.

Q. 3. Do you know when the City of Springfield first laid pavement under the F. J. Warren patent?

Objected to by Mr. Miller as indefinite and as calling for conclusions of law and opinions.

A. 3. The first pavement laid by Warren Brothers Company of Boston was laid in 1904.

Q. 4. When were the first pavements laid in the City of Springfield under the E. C. Wallace patent?

Same objection by Mr. Miller.

A. 4. In the year 1912.

Q. 5. Can you state about how much pavement was laid under these patents at that time?

Same objection by Mr. Miller.

A. 5. I can not state. The information can be obtained, however, from the official records of the City of Springfield.

Q. 6. During the years 1912 to 1915 did the firm of Adams & Ruxton Construction Company lay any pavements under the Wallace patent laying a fine bituminous mixture surface.

Same objection by Mr. Miller and also as leading.

A. 6. Yes.

Q. 7. Did you have any official connection with the firm of Adams & Ruxton at that time, 1912 to 1915.

A. 7. I did.

Q. 8. Where was the pavement to which you refer first laid.

A. 8. The pavement was laid on the following streets of the City of Springfield, namely: Pearl, Oak, Charles, Chestnut Streets, possibly ten to fifteen thousand square yards, and in West Springfield on the roadway leading to Westfield for a length of two miles over a width of eighteen feet.

Q. 9. Do you recollect whether any pavement was laid under the Wallace patent in Westfield on Main Street and Union Avenue?

Same objection by Mr. Miller, and also objected to as leading.

A. 9. Yes, pavements of that type were laid in Westfield on the streets mentioned, between five and ten thousand square yards.

Q. 10. Do you know of your own knowledge of a pavement having been laid on Chicopee Road from Springfield for a distance of approximately one mile towards Chicopee?

Same objection by Mr. Miller.

A. 10. I do.

Q. 11. What was the character of the pavement laid on this road, and under what specifications was it laid?

A. 11. The major portion of the roadway was paved with a mixture made in accordance with the Wallace methods. The balance of the pavement was made of a mixture made in accordance with Warren specifications.

Answer objected to by Mr. Miller as indefinite or if by reference to Wallace methods and Warren specifications reference to any patent is meant, objected to as involving conclusions of law and matters of opinion to which the witness is not qualified, and as to which he can not here testify under the order of the court.

Q. 12. Were the two methods of construction to which you refer laid on the same street, and subjected to the same travel? If so, what has been the effect on each?

A. 12. The two sections of the road are on the same street and are subject to the same amount of traffic, and the section laid under the Wallace method has proved more satisfactory and has required less repairs than the other section.

Q. 13. Will you describe the difference in the surface finish of the two methods of construction referred to?

A. 13. The surface of the roadway laid under the Wallace method is made up of sand, or very fine stone combined with sand, which, after heating, is mixed with hot asphalt; is then spread on a layer of stone and sand aggregate with asphalt which has been spread on the foundation; the whole being combined into a homogeneous mass under a heavy roller.

The surface of the pavement laid under the Warren method consists of the application of a squeegee coat of hot asphalt on the mixture of sand and stone aggregate, combined with heated asphalt, which has been spread on the surface of the roadway and rolled with a heavy roller. On top of the asphalt surface is spread fine stone and sand which has been heated, after which the surface is rolled with a heavy roller.

END OF DIRECT EXAMINATION.

CROSS-EXAMINATION BY L. G. MILLER.

X.Q. 1. In forming the squeegee layer, the fine stone and sand which was finally applied would be pressed into the asphalt by the final rolling, would it not?

X.A. 1. Yes.

X.Q. 2. How thick was this squeegee layer?

X.A. 2. A small fraction of an inch.

X.Q. 3. Can you state that fraction in approximate numbers?

X.A. 3. Probably an average thickness somewhat less than one-half inch.

X.Q. 4. When was this applied relatively to the laying of the layer underneath?

X.A. 4. Depending upon circumstances during the same day or the days immediately following the laying of the pavement.

X.Q. 5. Have you ever observed whether or not the time when such a layer was applied had any effect on the wearing qualities of the road?

X.A. 5. I have made no observations as to the effect of time which elapses after the laying of the pavement and before applying the fine stone.

X.Q. 6. In your answer to question 13, defining what you refer to as the Wallace methods you state that the fine stone which is spread on a layer of stone and sand aggregate is combined into a homogeneous mass. Did you use the word homogeneous advisedly?

X.A. 6. The word was used descriptively.

X.Q. 7. Then after the rolling the part which was originally the lower layer and the part which was originally the upper layer are all indistinguishably combined as a mass homogeneous throughout?

X.A. 7. The two layers are combined into one mass by the process of rolling.

X.Q. 8. Do the two layers remain distinguishable and of different character?

X.A. 8. The two layers do not combine into layers of uniform thickness because the second layer is applied to the first layer which at this stage has a relatively rough surface.

X.Q. 9. We might describe a roadbed as having two strata although the two strata would not be joined along a definite line of cleavage; on the other hand, the constituents of the lower layer might be forced up and through and intermingled with the body of the upper layer and vice versa in such a way that the entire structure would be of a homogeneous character throughout. I understand from the answers you have made that the first description would be the apt one.

Before answering your question, I would like to change the word homogeneous appearing in answer 13 to the word solid so that the sentence would read: The whole being combined into a solid mass under a heavy roller.

X.A. 9. The pavement which I have described is made up of two strata, which have been combined by means of a roller.

X.Q. 10. About how thick is the upper stratum? Under the construction to which I understand we both referred to in the last question, and which you have characterized as the Wallace construction?

X.A. 10. Probably one half inch to three-quarters inch in thickness.

X.Q. 11. Is the layer beneath this rolled before this upper stratum is applied?

X.A. 11. As I have previously stated, the lower layer is not rolled previously to the application of the second layer.

X.Q. 12. Then the pavements in Springfield concerning which you have testified and particularly the two portions of Chicopee Road represented on the one hand a squeegee finish in which sand or fine stone was applied after the asphalt had been spread over the previously rolled foundation, and on the other hand, pavements in which fine sand or stone and asphalt previously mixed were spread on a foundation layer which had not previously been rolled and these pavements did not include any wherein previously prepared mixture of sand and fine stone and asphalt were spread

on a foundation layer which previously had been subjected to pressure by roller?

X.A. 12. I wish you would make question clearer.

X.Q. 13. I will divide the question. None of the roads in Springfield concerning which you have testified were constructed by spreading a mixture of fine stone and asphalt previously mixed together on a foundation which had been rolled before the application of the mixture. Is that correct?

X.A. 13. Assuming that the word foundation as used in the question relates to an original layer of stone, sand and asphalt mixture, my answer would be that the original layer of asphalt was not rolled before the application of the second layer.

X.Q. 14. By the final rolling then, the material of the second layer would be forced down into irregularities of the first layer, and projecting portions of the lower unrolled layer forced up into the top layer?

X.A. 14. The material of the second layer would be forced down into the irregularities of the first layer. I do not know whether any of the particles of the first layer would be forced upward into the second layer.

X.Q. 15. But parts which are projected upwardly from the rough surface of the lower layer would project upwardly into the upper layer which was rolled down over them.

X.A. 15. I should assume that such would be the case.

X.Q. 16. What size stone is used in the lower layer?

X.A. 16. Stones of varying sizes up to one inch to an inch and a quarter, and possibly one and one-half inches, in diameter, to which might be added a certain amount of fine particles depending upon the specifications.

X.Q. 17. About how thick is the lower layer?

X.A. 17. The thickness of the lower layer would be such that after being combined with the upper or second layer a thickness of two inches would result.

X.Q. 18. When were the pavements laid on Chicopee Road?

X.A. 18. The Chicopee Road pavement was laid in 1913.

CROSS-EXAMINATION CLOSED.

RE-DIRECT EXAMINATION OF MR. ADAMS
BY MR. HEAD:

R.D.Q. 1. In laying the squeegee course referred to under the Warren construction, did you endeavor to lay any definite thickness of the squeegee layer of fine stone, or did you merely use sufficient sand or stone to cover the asphalt cement spread over the surface? To close the upper pores of the structure and to prevent the asphalt from adhering to the lower?

Objection by Mr. Miller as leading.

R.D.A. 1. No definite thickness of fine surfacing stone was intended to be provided. The fine stone served to fill the surface pores of the pavement and to prevent traffic from sticking to the surface.

R.D.Q. 2. Did any of the pavements laid under the Wallace method of construction, when completed, show that the coarse stone of the lower mixture had protruded through the finer surfacing mixture?

R.D.A. 2. No, sufficient of the fine surfacing material was applied to cover the first layer so that after rolling the coarse parts of the first layer did not protrude through the second layer.

R.D.Q. 3. When the pavements were completed under the Wallace construction, did they show a smooth surface composed of fine mixture of sand or stone with asphalt?

R.D.A. 3. They did.

RE-DIRECT EXAMINATION CLOSED.

RE-CROSS-EXAMINATION OF MR. ADAMS BY MR. MILLER.

R.X.Q. 1. In applying the second layer any irregularities and projecting portions of the lower layer would project up into the under surface of the upper layer as they might happen to lie, and thus become incorporated with that upper layer, however. Is that correct?

R.X.A. 1. I suppose that the upper portions of the lower layer would to a certain extent project into the lower portion of the second layer.

R.X.Q. 2. And the relatively fine material of the upper layer would be pressed down into the interstices of the uncompacted and unrolled lower layer?

R.X.A. 2. They would probably be compressed into the upper interstices of the lower layer.

R.X.Q. 3.

RE-CROSS-EXAMINATION CLOSED.

DEPOSITION CLOSED

Arthur A Adams

COMMONWEALTH OF MASSACHUSETTS)
COUNTY OF SUFFOLK)SS.

I hereby certify that on the fifteenth day of September, 1921, before me, Robert Fowler, a Notary Public in and for the Commonwealth of Massachusetts, in the City of Boston, County of Suffolk, personally appeared, pursuant to the notice hereto annexed, between the hours of ten o'clock A. M. and four o'clock P. M., the witnesses named in said notice, and James M. Head appearing for plaintiff and L. G. Miller appearing for defendants, and the said Charles S. Ashley, Arthur A. Adams and James A. Courtade, being by me first duly cautioned and sworn to testify the whole truth, and being carefully examined, deposed and said as in the foregoing annexed depositions set out.

I further certify that said depositions were begun on the fifteenth day of September, 1921 at ten o'clock A. M. and were completed the same day.

I further certify that the several exhibits attached to said depositions were offered in evidence and

marked for identification as is set out in said *depositions*.

I further certify that the said depositions were then and there reduced to typewriting under my personal supervision, and were, after they had been reduced to typewriting, subscribed by the witnesses, and the same have been retained by me for the purpose of sealing up and directing the same to the Clerk of the Court as required by law.

I further certify that the reason why the said depositions were taken was that the said witnesses reside at more than one hundred miles from the place where this cause is to be tried.

I further certify that I am not of counsel or attorney to either of the parties, nor am I interested in the event of the cause.

I further certify that the fee for taking said depositions, \$6 00/100, has been paid to me by the plaintiff and the same is just and reasonable.

WITNESS my hand and official seal at the City of Boston this 15th day of September 1921.

Robert Fowler (Seal)

Notary Public.

Commission Expires March 7, 1924

ROBERT FOWLER, Notary Public

[Endorsed:]

[Endorsed]: FILED SEP 22 1921 CHAS. N. WILLIAMS, Clerk By L J Cordes Deputy Clerk

[TITLE OF COURT AND CAUSE.]

REPORTER'S TRANSCRIPT OF TESTIMONY
AND PROCEEDINGS ON TRIAL.

LOS ANGELES, CALIFORNIA,
TUESDAY, NOVEMBER 8, 1921. 10 A.M.

THE COURT: Proceed, gentlemen.

Mr. Head for plaintiff read following statement
of plaintiff's case:

STATEMENT OF PLAINTIFF'S CASE

This is a suit brought by WARREN BROTHERS COMPANY, corporation organized under the laws of the State of West Virginia, as the owner of United States Letters Patent No. 959976, against THOMPSON BROTHERS, individually and as a firm, and the sureties on their bond, to recover damages for the alleged infringement of the above patent in the construction of a roadway on part of Route 5, Section A of the Highway System of Fresno County.

The file wrapper of the patent in suit, which will be offered in evidence, shows that the application was made for the issuance of a patent both for the process and the product actually produced, which was the wearing surface of a bituminous street pavement. This application was filed in June, 1909, and contained four claims, two of which were for the processes of producing and two for the product. After repeated hearings before the Patent Examiner in which several prior patents were considered, both process claims of the application were rejected, and the two

product claims of the patent as finally issued were authorized in May, 1910.

Specifications were adopted by the County of Fresno; bids asked for and were received on specifications marked Numbers 1 and 2 for doing the work on said roadway. The specification referred to as No. 1 was for the construction of an asphalt concrete pavement, and all work incidental thereto, including the grading of the sub-base, the construction of the foundation and placing the asphalt wearing surface thereon, referred to in the specifications as Type A.

Bids were also asked for and received at the same time on specification No. 2, which was for grading the roadway, for the construction of an asphalt concrete pavement thereon and all work incidental thereto, including the grading of the sub-base, the construction of the foundation, and laying thereon an asphalt wearing surface, referred to in the specifications as Type B.

The specifications for the wearing surface Type B were originally prepared by the engineer of the owner of the patent in suit for the construction of an asphalt wearing surface to be laid in accordance with the claims of the above patent No. 959976, which specifications were adopted by the County of Fresno upon the approval of the County Engineer. In the advertisement made by the Board of Supervisors, requesting bids upon Specification No. 2, the attention of prospective bidders was called to "that certain license agreement for the sale of Warrenite-Bitulithic paving mixture on file in the office of the Board of Super-

visors". The bids to be made were to be free from the payment of royalties or other charges for patented material.

The specifications for the asphalt wearing surface Type A were prepared by the County Surveyor of Fresno County and were approved by the Board of Supervisors of that County.

Under the license mixture agreement filed by WARREN BROS. COMPANY as the owner of the patent referred to, in order to provide for that competitive bidding which the law requires in letting all contracts for any public improvement, and in consideration of the adoption by the County of Fresno of such specifications as were necessary to provide for the improvement of this roadway, in accordance with the requirements of this patent, WARREN BROS. CO. offered to furnish to the County of Fresno, or to any bidder to whom a contract might be awarded, to improve any portion of the roadway on which bids were asked under specification No. 2, and who would enter into a contract with the County of Fresno to pave any section of said roadway with the Warrenite-Bitulithic pavement, certain material ready for use as required by said specifications, together with the right to use any or all of the patents, trademarks or trade names then owned or which might thereafter be owned by WARREN BROS. CO. necessary to lay said pavement, and in addition thereto furnish such other services as might be necessary to secure the proper construction of said improvement, in accordance with the

claims of said patent, at a fixed price, which price was the same to any and all contractors.

By the terms of this license mixture agreement the owner of the patent voluntarily surrendered any exclusive rights which it might have to its patent, and offered to furnish the County or any contractor certain material at a given price, which material the contractor would be required to purchase if the work was to be done in accordance with the specifications under which the bid was made.

After the bids were received for doing the work under specifications numbers 1 and 2 for both Type A and Type B for asphaltic wearing surface, the contract was awarded to the lowest bidder for Type A construction and the bids received on Type B constructions were rejected.

The answer filed by defendants THOMPSON BROTHERS, which answer was adopted by the County of Fresno after its intervention, asking to be made a party defendant, stated that the mixing and laying of the wearing surface on Route 5, Section A did conform to and was controlled by the specifications for asphalt wearing surface Type A, appearing at page 14 of the Exhibit No. 5 to complainants' bill.

In addition to this answer of all the defendants after the case was at issue, a stipulation was entered into whereby it was agreed that "specifications No. 1 and No. 2 for part of Route 5, Section A Fresno County Highway System on the 27th day of September, 1920 were duly approved and adopted by the County of Fresno, and that the pavement laid for

part of Route 5, Section A of the Fresno County Highway System was laid under said specifications and in accordance therewith."

In view of the answer and this stipulation the question which is presented for the consideration of the court is whether or not, as claimed by the plaintiff, the specifications for the construction of asphalt wearing surface Type A requires the construction of a street pavement which will infringe the claims of the patent owned by plaintiff, a printed copy of which is attached to plaintiff's bill and which the stipulation above referred to also agrees may be received in evidence with the same force and effect as if duly certified.

The requirements of the specifications adopted by the County of Fresno for the Type A construction and the claims of the patent in suit are both before the court and it is admitted by all parties that the work has been done in accordance with these Type A Specifications.

It is submitted that the defendants are now estopped from contending that the work as actually done does not infringe the claims of the patent in suit, if the specifications which they admit were complied with required an infringement. If, however, the specifications adopted do not require the construction of an infringing pavement, then the plaintiff in this case would be required to prove that the work as actually done did infringe the claims of the patent.

It is also submitted that the work as actually done, so far as this particular case is concerned, cannot be looked to by the court as controlling in any way the

meaning of the specifications under which the work was done, or to determine the meaning of the claims of the patent. The meaning of those specifications and the claims of the patent must be decided by the court from the face of the written instruments themselves.

Type A specifications prepared by the County Engineer adopted by the County under which bids were received, the contract awarded and the work actually done are precisely the same as the specifications prepared by the engineer of the owner of the patent in suit in the following particulars:

1. The grading for the roadway and the preparation of the sub-base are the same under both specifications.
2. The preparation and laying of the foundation on which the asphalt wearing surface is to be laid is precisely the same in both cases
3. The grading of the mineral aggregate, as well as the proportion of mineral aggregate and bituminous cementing medium, for the coarse and fine mixtures, used in the asphalt wearing surfaces Types A and B are precisely the same.
4. The amount of fine mixture to be used under both specifications was substantially the same.
5. The coarse and fine mixtures were prepared and laid separately under both specifications.

6. The thickness of the Asphalt Wearing Surface, referred to as "top course" in Item 2 page 17, is one and one-half (1 1/2) inches irrespective of whether Type A or Type B Asphalt Wearing Surface is used.

The Type A and Type B specifications having specified precisely the same proportions of both mineral aggregate and bituminous cement to be used in the upper and lower courses, the differences if any between the two constructions must be found in the method of the application of the wearing surface to the foundation, since the sub-base and foundation were the same in every respect under both specifications.

The engineer for the owner of the patent and the County Surveyor of the County of Fresno, no doubt, undertook to point out and require that the use of the material (which was the same under both specifications) should be applied in such a way, as each thought would produce the best results.

The first claim of the patent in suit is for "a pavement consisting of a lower course of large pieces of stone, smaller pieces of stone and stone dust, mixed with sufficient bitumen of proper consistency to thoroughly coat all of the particles which are previously mixed and then laid, without compression, on a suitable foundation, and a previously mixed upper course, composed of finely divided mineral matter mixed with sufficient bituminous binding material to thoroughly coat all of the particles which is first spread in a thin

layer on the lower course and thereafter blended and bonded with the lower course by compressions, whereby the two courses are made a compact and substantially integral mass which is densest at its top”.

The second claim of the patent is for a pavement comprising a foundation, a lower course thereon made up of large pieces of stone, smaller pieces of stone and stone dust, mixed with sufficient bitumen of proper consistency to thoroughly coat all of the particles, and an upper thin course disposed on the lower course and blended with the coarse mixture at the top of the mass, whereby the two layers are bonded into one and a compact rigid layer densest at the top is formed.

The only difference between the two claims of this patent is that the first claim of the patent provides for laying the fine top course on the lower coarser course without compression of the lower course, and the second claim of the patent merely requiring the laying of the top course on the lower course and blending this with the lower course mixture at the top of the mass, whereby the two layers are bonded and blended into one and a compact rigid layer densest at its top is formed. In the latter claim nothing is said which requires or prohibits initial compression of the lower course before the application of the top course is made, but both claims require that the two courses shall be ~~b~~onded and blended at the top of the mass and one compact rigid layer formed which is densest at its top.

The specifications attached to and made a part of this patent points out what in the opinion of the pat-

entee is the best means of accomplishing this result, and explains to any one skilled in the art of paving how this result may best be accomplished, but expressly states in these specifications that it is obvious that in the future practise of the invention such changes may be made as do not involve departure from the scope of my invention as claimed". Whether or not the changes made in the method of producing the result by the adoption of the Type A specifications was such a change as involved a departure from the scope of the invention, for which the patent was issued, is a question which can easily *by* decided by the court, upon an examination of the claims of the patent and the specifications under which the construction was laid.

The method of constructing the complete asphalt concrete pavement in which the asphalt wearing surface Type A was used, was to require that "the pavement shall be laid in two course or compression; the lower or base course shall be approximately three and one-half ($3\frac{1}{2}$) inches in thickness, after compression, and the top course shall be approximately one and one-half ($1\frac{1}{2}$) inches in thickness, after compression." (specifications page 17 Item 2).

Sub-sections "A", "B", "C", "D", and "E" of these specifications then provide for the character of the plant to be used, the heating of the mineral aggregate and the asphaltic cement, the mixing, hauling to the street and spreading the same.

Sub-section "F" of these specifications provide that "after the binder course has been uniformly spread it

shall be given an initial compression by means of a tandem roller weighing not less than 3 tons. The binder course shall then immediately be covered with the finishing course."

Sub-section "G" of these specifications then provides that "immediately after the finishing course has been uniformly spread, as above provided, the pavement shall be rolled with a steam roller, weighing not less than 12 tons and giving a compression of not less than 300 pounds per linear inch width of tire. The rolling shall continue until the surface is unyielding and true to brade and cross-section. Such rolling must be contiuous and one roller must be provided for each 10,000 square feet of surface laid in any one working day. Immediately after final rolling a thin layer of hot gravel or crushed stone screenings shall be spread over the entire surface of the pavement and finally rolled." The character of the crushed stone, gravel sand and lime dust to be used is then provided and the penetration, solubility, ducility and evaporation tests to which the asphaltic cement to be used must conform is then specified. If, therefore, assuming that the patent sued upon is valid, the question for the court to decide is whether or not the specifications adopted by the County of Fresno for the Type A construction, if complied with, will produce such a product as is covered by either or both of the claims of the patent.

Will the initial rolling of the binder course with a tandem roller before laying the finishing course and

then immediately covering this with the finishing course and after this finishing course is laid at the temperature specified, has been uniformly spread and the rolling continued with a steam roller of not less than 12 tons until the surface is unyielding, prevent the production of a compact and integral mass which is densest at its top? If so, then the patent in suit has not been infringed.

Either the intention of the framer of these specifications for Type A was to prevent the bonding and blending of the two layers into one compact rigid layer densest at its top, or else it was intended to produce that result.

If it had been the intention of the engineer to prevent the blending and bonding of the two layers into one, the obvious method of doing so would have been simply to follow the usual well established and well known non-patented methods of laying standard sheet asphalt pavement wearing surface on a binder course which would have substituted through compression for the initial compression of the lower course with a tandem roller, and would not have required the immediate laying of the finishing course.

Either these requirements were intended to produce or prevent the blending and bonding of the two layers into one layer densest at its top, or else these terms are entirely meaningless. It cannot seriously be argued that these terms are mere surplusage and were not intended to produce some definite result. It cannot be seriously insisted that they were intended to prevent

the blending and bonding of the two layers into one since that result could have been actually accomplished in the usual manner so that the only possible effect in providing for their use must be to produce the result which the claims of the patent describe.

Whether or not the initial compression of the lower course before spreading the finer course and giving the pavement its final compression will result in the construction of a better street pavement is a question about which there may be an honest difference of opinion, but there can be no question that the initial rolling provided, required by that specification, does not involve such a departure from the scope of the invention claimed by the patent as will avoid infringement.

Statement of case referred to on page 1 of Reporter's transcript. Filed by consent

J. M. Head

Paul S. Honberger

Solicitors for plaintiff

Lyon & Lyon

Solicitors for defendant.

[Endorsed]: FILED JAN 16 1922 CHAS. N. WILLIAMS, Clerk By L. J. Cordes Deputy Clerk

"It was stipulated and admitted in evidence that corporation plaintiff was a corporation organized under the laws of the state of West Virginia; that copies of United States patents may be introduced without certificates; that file wrapper of patent in suit, duly certified, be admitted in evidence, marked: 'Plaintiff' Exhibit No. 1.'"

(Document filed as Plaintiff's Exhibit No. 1.)

MR. EVARTS: And this file wrapper is also considered read, if your Honor please, for the purpose of the record?

THE COURT: Yes.

MR. EVARTS: Mr. Lyon, I understand it is expressly admitted by your answer that a contract was entered into, and bonds for the material men and for the faithful performance were duly - -

MR. L. S. LYON: I think, Mr. Evarts, we might cover it in this way, that we admit the authenticity of Exhibit No. 5 to your bill of complaint, which includes both the specifications and all of these bonds and contracts, and that we waive any proof of those specifications or contracts or bonds.

MR. EVARTS: And that you not only waive any proof, but that they are admitted in evidence?

MR. L. S. LYON: Well, yes.

MR. EVARTS: And that they are considered read?

MR. L. S. LYON: Yes; that is satisfactory.

MR. EVARTS: That includes the publication of notice alleged in our bill of complaint and - -

MR. L. S. LYON: That is Exhibit No. 4, the notice is, and that may be considered including Exhibit No. 4, as well as Exhibit No. 5.

MR. EVARTS: And it is considered read:

MR. L. S. LYON: Yes.

MR. EVARTS: Exhibit No. 5 includes the bid of Thompson Brothers, as I understand it, the specifications for Type A and the material men's bond and the bond for faithful performance.

MR. L. S. LYON: That is the way we understand it; yes.

MR. EVARTS: And all of those are admitted in evidence and considered read.

MR. L. S. LYON: Yes. Those exhibits are attached to the bill of complaint and marked as exhibits 4 and 5.

THE COURT: The exhibits offered in court, then, will be carried on with consecutive numbers following those; is that the idea?

MR. EVARTS: Yes.

MR. L. S. LYON: I think the first exhibit was the file wrapper, and that should be No. 6; so that we start from No. 6 on.

MR. EVARTS: At this time we will offer in evidence the specifications for Type B.

MR. L. S. LYON: And they are included in the exhibit and made subject to the same understanding that we have just gone through.

MR. EVARTS: That they are in evidence and considered read.

MR. L. S. LYON: Yes.

MR. EVARTS: We are now offering letters sent to Thompson Brothers under date of November 9 and to J. B. Hill, one of the bondsmen, and H. E. Vogel, the other bondsman, and to the board of supervisors.

MR. L. S. LYON: We will admit the authenticity of these copies and waive proof, and they may be considered read.

MR. EVARTS: Very well. Then we will introduce in evidence at this time, subject to the statement of counsel, a letter under date of November 9, 1920, to Thompson Brothers, Eugene O. Thompson, Claude M. Thompson and O. M. Thompson, Fresno, California. (Reading same.)

And the letters to J. B. Hill, H. E. Vogel and to the board of supervisors are to similar effects, and are considered read.

(Documents filed as Plaintiff's Exhibit No. 7.)

MR. EVARTS: Now, if your Honor please, we offer in evidence the license mixture agreement filed with the County of Fresno on October 1, 1920.

MR. L. S. LYON: That is the exhibit in the bill of complaint, is it?

MR. EVARTS: That is Exhibit No. 3 of the bill of complaint.

MR. L. S. LYON: That may be subject to the same stipulation that we have made. The only in-correction we have noted in your statement is that we do not consider it an agreement. It appears to be more of an offer.

MR. EVARTS: Whatever it is, it is attached to the bill as Exhibit No. 3, and is offered in evidence at this time without objection, and is considered read.

MR. L. S. LYON: I understand from your answer that you admit that the work in question on Blackstone Ave., as set forth in our bill of complaint, was shown under Type A specifications which we have introduced in evidence, and under the contract.

(Testimony of George C. Warren.)

MR. L. S. LYON: That is the way we understand it; that it in no way departed from the specifications of Type A in evidence.

MR. EVARTS: Then that is your admission.

GEORGE C. WARREN,

called as a witness on behalf of plaintiff, being first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. EVARTS:

Q Your name is George C. Warren?

A Yes, sir.

Q. What position, if any, or what connection, if any, have you with Warren Brothers Company?

A I am at present the chairman of the executive committee of the board of directors.

Q You are a member of the board of directors?

A Yes, sir.

Q You are familiar with their business and their operations?

A I am.

Q You reside in Boston, Massachusetts?

A Yes, sir.

Q That is the main office of the company?

A. Yes, sir.

Q How long have you been connected with the company, Mr. Warren?

A Since 1901.

Q And you have been continuously with the company since 1910?

(Testimony of George C. Warren.)

A Yes, sir.

Q From 1910 what official positions have you occupied in connection with the company down to date?

A I was president of the company until March, 1921, and since that I have been chairman of the executive committee of the board of directors.

Q From 1910 to March, 1921, you have been president of the company, then?

A Yes, sir.

Q You are familiar with patent No. 959,976?

A I am.

Q Now that patent was issued May 31, 1910. When did your company first begin to use that and put work upon it?

A The patentee brought it to our attention in the year 1910, shortly after it was issued, and we at that time were skeptical of its utility and practicability, but we made a tentative arrangement for an option for the use of the patent, having the right to use it on a trial basis for two years, and on the expiration of that two years, in the year 1912, we acquired the exclusive use of the patent.

Q Did you use it any prior to 1912?

A Yes, sir; in a trial way.

Q And from that time down have you continued to use it?

A Yes, sir.

MR. L. S. LYON: We object --

MR. EVARTS: This is just a preliminary question.

(Testimony of George C. Warren.)

MR. L. S. LYON: We object to his stating whether he used the patent or not. That is a mere conclusion of law.

Q BY MR. EVARTS: Well, did you lay pavements under this letters patent?

MR. L. S. LYON: We think that is open to the same objection, your Honor, particularly as there is a dispute as to what the scope and bounds of the patent in suit are; and for the witness to say that he followed the patent or laid the pavement under it is merely to usurp the court's function of interpreting the patent.

MR. EVARTS: I don't think so, your Honor.

THE COURT: Well, I suppose what you want to get at is that they have been trying to lay pavement under the patent anyhow.

MR. EVARTS: Yes, we have been doing the best we could.

Q. You have continued to lay it from that time?

A Yes, sir.

Q You are familiar with the books and records of the company, and have you caused a statement to be made showing the extent of highway constructed under the use of that patent since that date?

A I have.

Q Have you that with you?

A Yes, sir (producing paper).

MR. EVARTS: We offer this in evidence as showing the yardage laid under this patent by the Warren people from 1910 to August 31, 1921.

(Testimony of George C. Warren.)

THE COURT: How many yards is it?

Q BY MR. EVARTS: If you will give the totals there, please.

A Would you like to have me cover the particulars, your Honor?

THE COURT: Oh, no; just how much business have you done under that.

A A total of 18,008,602 square yards. And during the year 1921 that has been 82 per cent of our entire business.

Q BY MR. EVARTS: But this shows by years the amount each year?

A Yes, sir.

Q Not only by you personally but by your licensees?

A Yes, sir.

MR. EVARTS: Take the witness. This is considered read.

(Statement filed as Defendant's Exhibit No. 8.)

MR. L. S. LYON: In regard to Plaintiff's Exhibit No. 8 we make the objection that the witness's testimony that all of this yardage was laid under the patent should be taken subject to our objection. It is not shown what the method was, and it involves an interpretation by the witness on a point of law as to the scope of the patent.

MR. EVARTS: It is only offered for the purpose of showing the attempted use, at least, under this patent, and the extent of that use.

THE COURT: All right.

(Testimony of George C. Warren.)

MR. L. S. LYON: May I have a copy of that?

MR. EVARTS: Yes.

Q Warren Brothers maintain an organization, do they, Mr. Warren?

A They do.

Q What is the extent of that organization?

A It practically covers the entire United States and Canada. That table shows we have actually laid pavements in 41 states of the United States; and, while it is not shown on the table, we have laid it in every province in Canada.

Q And your business is strictly a street paving business?

A Yes, sir.

Q I will ask you whether or not your company has expended any particular amount of money in developing this particular patent.

MR. L. S. LYON: That is subject to the same objection with regard to that.

THE COURT: Same ruling.

A We have.

MR. EVARTS: Take the witness.

CROSS-EXAMINATION

BY MR. L. S. LYON:

Q I hand you a copy of letters patent No. 727,505 granted May 5, 1903, to Frederick J. Warren. Are you familiar with that patent (handing paper to witness)?

A I am.

Q How much of this pavement that is mentioned

(Testimony of George C. Warren.)

in your Exhibit No. 8 was laid under that patent, Mr. Warren?

MR. EVARTS: You refer to the statement that this witness has just furnished and that has just been introduced?

MR. L. S. LYON: Yes.

A If you will show me the statement I can tell you.

Q I refer to your Exhibit No. 8.

A I say, if you will show me the statement. It is on the statement there.

(Document handed to witness.)

A During that same period, 1910 to 1921, inclusive, there was laid under patent 727,505 43,290,000 square yards, of which only 937,000 was laid during the past year and present year.

Q In 1910 can you give the relative percentages of your business that was done under patent 727,505 and the patent in suit?

A Yes, sir. Three-tenths of one per cent of the total business was under the patent in suit.

Q In 1910?

A Yes, sir.

Q And the rest of it was under the patent 727,505?

A Yes.

Q Now, how about 1911?

A In 1911 we laid none under the patent.

Q That you have under 727,505?

A Yes, sir.

Q Will you continue on down to the present date, specifying by years the same subject?

(Testimony of George C. Warren.)

MR. EVARTS: Of course this is all shown in detail.

MR. L. S. LYON: I just want to get it in detail into the record.

THE COURT: Well, if it is shown in the statement it is already in the record, and once is enough.

MR. L. S. LYON: Can the witness have a copy of this, Mr. Evarts?

MR. EVARTS: Yes. (Handing paper to witness.)

MR. L. S. LYON: On the first page of the exhibit this same material appears, so that it will not be necessary for me to ask that last question, and I will withdraw it.

Q Mr. Warren, did you collect royalty under patent 727,505 prior to May 3, 1920, on the pavement which you specify in Exhibit 8 as having been laid under the patent in suit?

A We either collected a royalty or did the work ourselves.

Q And you collected it under 727,505?

A Well, I don't understand your question. If you will repeat it, please.

Q Prior to the expiration of patent No. 727,505 you collected royalty, did you not, on that pavement which your statement states was laid under the patent in suit; is that correct?

A All of our licenses permit the use of any and all of our patents. Sometimes one patent might be involved and sometimes two.

Q Now prior to the expiration of your patent 727,-

(Testimony of George C. Warren.)

505 on May 3, 1920, you brought numerous infringement suits in this country, and those were always under patent 727,505, were they not?

MR. EVARTS: We object to this as entirely incompetent, irrelevant and immaterial and not cross-examination.

MR. L. S. LYON: We are trying to show the facts - -

MR. EVARTS: It is entirely with reference to bringing suit under a different patent, your Honor.

MR. L. S. LYON: We want to show that these pavements were laid under an expired patent, and that the monopoly and royalties collected were under the guise of patent 727,505.

MR. EVARTS: The statement shows exactly how much was laid under the respective patents. No question was asked this witness on direct examination as to any other patent than this one.

MR. L. S. LYON: I should think it would have a bearing on the weight of his statement that these figures represent pavement laid under the patent in suit to show that royalty was collected under another patent.

THE COURT: Well, yes; otherwise it may be said it was laid under some other patent.

MR. L. S. LYON: Yes.

THE COURT: Objection overruled.

(Last question read.)

THE COURT: Suppose you call that the Warren

(Testimony of George C. Warren.)

patent. Life is too short to repeat that number each time.

MR. L. S. LYON: All right; I will designate patent 727,505 as the Warren patent hereafter.

A Yes; and we knew of no infringement under the other patent during that period.

Q Now you have stated that you have an organization in the United States. Is it not a fact that your company makes a practice of filing voluntarily license offers with practically all counties and cities and other bodies politic when your company is informed that there is any paving to be done in those bodies politic?

A We generally aim to offer such an agreement.

Q And the filing of those licenses is a voluntary act on your part, is it not?

A Voluntary; yes. Sometimes we are requested, and sometimes we suggest it. It is always voluntary in that we are always willing to do it.

Q Now when a pavement is laid under one of those license offers how does Warren Brothers derive its compensation?

MR. EVARTS: We object to that as entirely incompetent, irrelevant and immaterial and not responsive to any issues in this case, and not cross-examination.

MR. L. S. LYON: We want to show, if your Honor please, the facts surrounding the amount of pavement which the witness claims has been laid under this patent and why it was laid. That is to say, we think that it does not appear clearly to the

bodies politic that they are paying any royalty to Warren Brothers, and that the royalty is gotten in a very roundabout way, and we want to bring out that fact as bearing on the weight of the testimony that there has been a large amount of pavement made under the patent in suit. To show, in other words, that it was laid under a misapprehension as to Warren Brothers receiving anything from it.

MR. EVARTS: The question is what compensation.

MR. L. S. LYON: And how they got it.

MR. EVARTS: Yes; and what that has to do with the validity of this patent I fail to see, your Honor. That is the issue here.

THE COURT: Well, what did it have to do with the validity of the patent -- the fact that they laid 18,000,000 square yards?

MR. EVARTS: Well, this: A patent may be a paper patent, or a patent that has never been used at all, and for the purpose of showing that it was a patent used by this company in good faith it is pertinent, as I understand, and proper, for the plaintiff to introduce evidence to show that pavements had been laid to a considerable extent under this patent. That is the only purpose of it. It only goes to the extent of the use, that is all, and it lays a foundation, of course, and is admissible for the purpose of proving damages hereafter.

MR. L. S. LYON: The witness, as I understood, testified that his company had laid so much pavement.

Now I am trying to find out what he means when he says they laid it, to show what his company got for the laying of it, if anything, and how they got it. It certainly goes to clear up what he meant when he said they laid it.

THE COURT: When they laid it they put it down.

MR. L. S. LYON: No, I don't think they did, your Honor, if I can bring out the facts from the witness. I don't believe they laid any of it at all.

THE COURT: Well, it is a fact of so slight importance anyhow, and we don't want to go into something that is not involved here.

MR. L. S. LYON: We just want to show that by some very silent and sub rosa agreements these people got their money without knowledge of these bodies politic that are laying the pavement.

MR. EVARTS: Now if that were an issue we would be glad to meet counsel upon those insinuations.

THE COURT: Well, wait a minute. Suppose you do, then what?

MR. L. S. LYON: I just want to show those facts to show that the bodies politic and other contractors are the ones that laid this pavement, and not that Warren Brothers laid any of it. The witness has said that they laid it.

THE COURT: What difference does that make?

MR. L. S. LYON: It only goes to the weight to

be given to his testimony that they laid so much pavement when I do not believe they laid any of it.

THE COURT: The amount of pavement they laid is immaterial, anyhow.

MR. L. S. LYON: With that understanding, we will withdraw the question.

THE COURT: All right.

MR. EVARTS: The testimony is, if your Honor please, that it was laid by him or his licensee.

THE COURT: All right.

MR. L. S. LYON: That is all, Mr. Warren.

MR. EVARTS: That is all. Now, if your Honor please, according to the view we take of this case at this time we think it is proper for plaintiff to rest its case, permitting the defendant to introduce his evidence showing in what particulars there is any infringement, and we to reserve the right to rebut that testimony. We think that that is not only the proper way to try the case under the decisions and the law, but, in addition to that, we do feel that it will greatly hasten the speedy presentation of this case to your Honor. I have just had a brief conversation with Mr. Lyon with reference to that, and the result of it is -- as I believe at least -- that either side will not make any particular point as to the order in which the respective testimony shall go in by either side.

MR. L. S. LYON: We might state, your Honor, that if plaintiff has any more *prima facie* case we expect him to produce it at this time, and that if

he cares to rely on the present case we concede that he has a full right to rebut any proof that we put in, but will insist that the proof thereafter be confined to rebuttal of the issues that are raised by our defensive matter.

MR. EVARTS: The question as to the difference between what is exactly a *prima facie* case and what is rebuttal is, in my mind, rather close at times, and it might require us to go into a lot of matters as a matter of safety against any objection hereafter, which would consume a considerable time. We believe right now that we have made a *prima facie* case without any question.

THE COURT: Well, believing that, why not rest?

MR. EVARTS: But I don't want to be in the position of having omitted some point that perhaps should have properly been covered on direct examination and not having it admitted hereafter on the theory that it is not proper rebuttal. We do not believe that expert testimony along the line of what is covered by our patents and the construction of our patents and of our respective specifications is any part or portion of our original case.

MR. L. S. LYON: If counsel is concerned with expert testimony, we might state, your Honor, that it is our position that this court has already indicated the manner in which expert evidence shall be received in this case by entering an order under Equity Rule 48 that we file all expert evidence, *prima facie* and rebuttal, that is, the direct examination of the wit-

nesses, in affidavit form, and that we consider that those affidavits and the cross-examination of the witnesses are the only expert evidence to be received in the case. I do not think there is any need of hesitancy about what our respective rights are as to expert evidence.

THE COURT: Are those affidavits on file here?

MR. L. S. LYON: Yes, your Honor.

THE COURT: Well, that is in conformity with the rule. That is the way we take expert evidence here.

MR. EVARTS: Under the rule, if your Honor please, are we at this time to introduce our affidavits that were taken and then submit the witness to cross-examination as a part of the original case, or does that come as a matter of rebuttal if it is so desired?

THE COURT: It doesn't make very much difference when it comes. The affidavits are on file, I suppose. That is the main thing.

MR. EVARTS: But are they evidence until they are introduced in evidence and the witnesses submitted to cross-examination?

MR. L. S. LYON: Might we not consider them read now, your Honor, and in evidence?

THE COURT: Yes, they may be considered, all of them, as in evidence. You can offer them whenever you want to. They are on file, and everybody knows what they are. Now that is the point about that. There will be no surprise in that. They may be offered at any time you want to offer them, either

now or as rebuttal. They are properly admissible as rebuttal, I suppose, or ought to be.

MR. EVARTS: Then the affidavits being on file the court's statement, I understand, is that they are in evidence at this time.

THE COURT: Yes, or considered in evidence. I don't want them in evidence unless they are necessary. Now when the time comes you can offer them.

MR. EVARTS: At any time during the trial?

THE COURT: Yes. They are here, and the parties know what is in them.

MR. EVARTS; Well, with the understanding that we can introduce our affidavits at any time during the case, and that they are now on file and in evidence, we rest.

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D E F E N S E .

MR. L. S. LYON: If your Honor please, this is a case in which the plaintiff asserts that the standard specifications adopted by the County of Fresno for its highway construction are an infringement of the letters patent in suit. For that reason, although the case was filed originally against the contractors and their sureties, the County of Fresno sought leave to intervene, and the case is defended by counsel employed by the County of Fresno. In other words, the County of Fresno has assumed the burden of withstanding the claim that its standard specifications for this work are an infringement of the letters patent in suit.

This matter goes back quite a little ways. The paving industry, of course, is an old industry, and these pavements are very much the same, all of them; but it goes back to one landmark, as we view it, in the paving industry, and one landmark, as we view it, to which plaintiff, Warren Brothers, owes its position in the business. We admit that it is a large company; we do not admit that it has ever laid any pavement at all, and do not believe that it has, but we think that whenever there is any pavement to be laid they go in and file, as anybody has a right to file, a paper with the officials or whatever body politic is to lay the pavement, which paper is a purported offer that they can use their Warren Brothers patents - - any they may have. They do not ask for any royalty; and it includes every patent they have, as far as the license says.

Reference has already been made in the testimony of Mr. Warren to patent No. 727,505 granted on May 5, 1903 to Frederick J. Warren for a pavement. Now this is a most important patent as bearing upon this case, and I am going to offer the court a copy of the same for its own use to that it may have it whenever reference is made to this patent (handing document to court).

Now as to this patent 727,505, looking at the drawings, on the left-hand side the court will see some figures, for instance figure 3, which shows a base, which is denominated "B", and on that base is superposed what is known in the art as a binder course, and

on top of the binder course "A" is laid, as shown in Figure 3, a top finishing course "C", making a three-course pavement as illustrated in the drawings. Now the bottom course "B" in the art comprises either a cement concrete or an asphalt concrete mixture of the concrete and the mineral substance to form a base, such as the court is familiar with on the state highways which merely have this concrete base and nothing else. Then on top of this base Warren laid a binder course "A", and on top of the binder course he laid the finishing course "C". Now the secret of the Warren patent -- and we refer to the Warren patent because it is to it that plaintiff owes its position in the art -- the secret of this Warren patent referred entirely to course "A", the binder course.

Now beginning at line 18 of the specification, on the first page, it says:

"The invention is based upon my discovery that to insure the best conditions of construction, wear, and life in such pavements the portion of the pavement to which my invention relates must be made as dense, as free from voids as possible, and also stable and non-labile to displacement, and upon my further discovery that what has ordinarily been supposed to be the best provision for eliminating voids and establishing stability has, as a matter of fact, been almost the poorest provision for accomplishing these purposes. The provision usually accepted as the best is that in which the

mineral matter used as a basis of the pavement and united by the plastic asphalt vehicle shall be in the shape of a sand or fine gravel. This, however, is an error, as I have discovered by experiment that there is a smaller percentage of voids in a pavement which contains mineral components which are of relatively large size. The method has been in the construction of this class of pavements to exclude from its composition all pieces of stone or sand larger than one-tenth of an inch in diameter; but by so doing the smallest percentage of voids that it has been possible to produce has been twenty-one per cent. of the aggregate, while by the use of the larger-sized grains or pieces -- say up to those which will pass through a two-inch ring -- and employing with these larger grains proper quantities of the smaller sizes down to an impalpable powder it is possible to reduce the voids of the mineral base below ten per cent. of its bulk, and such a mixture when assembled and compacted together will form a dense, solid, homogeneous, compact body with the smallest percentage of voids and possessing the highest degree of stability, and one in which the largest and smallest pieces are associated with each other indiscriminately throughout the structure," etc.

Now we want to bring that to the Court's attention, that here these people had a patent which expired on May 3, 1920, and which gave them the exclusive monopoly to use a graded material to reduce

the voids in the binder course. For instance, claim 5 of this patent says:

“In a street-pavement, a bituminous mineral structure, the mineral ingredients of which are mixed and of several grades, so graded as to give the structure an inherent stability.”

And the other claims are in different language, but all referring to this grading of the aggregate for the binder course.

Under this patent plaintiff enjoyed a very lucrative monopoly. In the case of *Warren Brothers v. City*, 166 Fed. 309, this patent was held valid by the Circuit of Appeals for the Sixth Circuit, and infringement was enjoined, in which case Judge -- afterwards Justice -- Lurton expounded the theory of this grading of the mineral aggregate. In other words, what Warren discovered was the fact that if you take large stone and then take smaller stone, and then take smaller still, down to an impalpable dust, and mix them together, you will have the least possible percentage of voids that it is possible to get, and that this will contain a much less percentage of voids than if you just use sand. Now that was rather a striking thing to a lay mind, but it grows out of this proposition, as we view it, that a solid is necessarily more dense than it will be if it is broken up into pieces, and that the more you break it into pieces the less dense it will be, and tests have shown that sand contains a very high percentage of voids -- higher than thirty per cent -- and that by using large, solid pieces and then filling in the voids that they

leave with smaller pieces you get a more dense proposition.

Now this patent was made a sort of fundamental proposition in the paving business. To be able to lay pavement and not infringe that patent, or to avoid a claim of infringement by Warren Brothers, it was necessary to just lay a concrete base, as our state highway system does. Up until recently they have put no surfaces on their concrete base. When you cover this over with a binder course, which is to protect the base from shock and seal it from moisture, and so forth, you begin to have to use this graded material, and you come in under Warren's patent.

Now there were a number of cases under Warren's patent. In the case of *Evans v. Warren Bros.* the Circuit Court of Appeals of the Third Circuit, as late as 1917, in 240 Fed. 696, the court discusses it and holds that it is valid, and holds that certain specifications which were used in Pennsylvania as public specifications were not an infringement, on the ground, as I view it, that they did not contain any graded mineral aggregate; and in a number of other cases this same patent was asserted and has always been sustained. I do not think it was ever declared void.

Up until May 3, 1920, Fresno County paid to Warren Brothers what they asked, and in the manner in which they asked it, under the guise of contracts back and forth between contractors, their compensation for this patent on all pavement that was laid in Fresno County that included the base with the wearing surface put on to protect the base, and

they paid it for all pavement that was laid under any contract that was entered into prior to May 3, 1920.

Now when this patent ran out on May 3, 1920, the County of Fresno felt that they had paid what they should under that monopoly; that under the patent law when a patent expires you are free to use it, and therefore they instructed their county surveyor, Mr. Jensen, to prepare specifications, and that they would proceed accordingly. At this stage the Wallace patent in suit comes in. Prior to the expiration of the Warren patent the Wallace patent, to all intents and purposes, was unheard of. It was never mentioned in any license contracts, and nobody had ever heard of it at all. It is a peculiar thing, what this Wallace patent is. In the first place, it is on the same base as the old Warren patent; and, in the second place, it is on the same binder, made in the same way and put on the base as in the Warren patent; and then it adds to that putting on top of the Warren base a mixture of sand and bitumen. Now that was all old, old long before Wallace ever made any invention at all, old in the Warren patent and old in numerous other patents. The only thing that Warren had patented was that grading in the binder course. Now the only thing that Wallace added in the Warren patent and the others is the one thing I have mentioned; and it is our contention in this case that the Patent Office, by its proceedings, granted him a patent on just that one proposition, and that that proposition is just what we did not use in Fresno County.

Referring to the patent in suit, just so that we may make ourselves clear, beginning at page 1, lines 41-2, it states that the patent calls for a base "A", and this is stated to be any kind of base, and the patent reads: "may be of any character consonant with the purpose of my invention". Now it is obvious there is nothing new in the base.

Then on this base the patent specifies that there shall be placed a covering formed by a course "B" and a top course "C". Now the course "B" is the binder course, and it is stated, on page 2, lines 49-52, to be composed "of large pieces of stone, smaller pieces of stone and stone dust mixed with sufficient bitumen of proper consistency to thoroughly coat all the *particiles*", etc.

There we have lying on the old base the same Warren binder of which plaintiff enjoyed a full monopoly, and which is now free to the public because he has had his seventeen years and the public now gets its consideration for the grant of that patent, to wit, the right to use that binder for the rest of all time.

Now the patent does not specify particularly the proportions of that binder course, but it does specify, on page 1, at lines 47-53 "stone of a size to pass through the interstices of a screen giving a stone, the largest of which, is the maximum size desired, and this stone together with smaller pieces of stone and comminuted stone or dust, in the state that the whole run is discharged from a crusher", etc. There they are referring again to the graded aggregate which was patented in the Warren patent.

Now passing to the top course "C", it states, on page 2, at lines 56-58, that this top course "C" is composed of "finely divided mineral matter mixed with sufficient bituminous binding material to thoroughly coat all of the particles". In other words, they take a mixture and put it on the binder course as a dressing. Now that is nothing different in principle or in nature from what *id* described in the Warren patent, and as we shall show when we come to our case, in a number of other patents. For instance, referring back to Warren patent 727,505 we find that there is a top course, and if the court will look at page 1 of the specifications, line 90, you will notice it says: "It will be understood that this pavement is used as the upper or wearing section of a roadbed - -"

It is there speaking of the binder course. "- - and that it may be covered, if desired, with a relatively thin surfacing of clear asphalt-cement or an asphalt or bituminous composition of any desired nature. In some instances there may be rolled into this thin surfacing while it is yet soft *sufficient* sand, gravel or fine stone to prevent its displacement by traffic." Now there is a mixture for your top course "C". There are the three courses of pavement described in Warren. Now we will show that we are not showing the only one that had that exact combination, but that there were a number of others, and patents, for that matter, in this country, and some in England, that showed this same thing. The only thing Warren has new in his patent is those proportions in the binder course; otherwise his was old.

Now what did Wallace invent? He has the same three mixtures. What did he invent, is the question? We can turn to his patent very nicely and see what he says he invented. We have shown that the Wallace patent is not particular about these proportions, other than that they shall be these same old proportions. It does not state any proportions of the surface "C" or anything except that they shall be graded in the manner well known in the art for binder course. Now what do they say is new in Wallace? Here is what it says in no less than nine different places in the two pages of this patent to Wallace; it states that this binder course "B" which is shown in the drawing shall be spread on the concrete surface or foundation, and then before there is any rolling or any compression of any kind of the binder course that you shall spread on it this mixture for the finishing course "C"; and then it says that if you then, thereafter, for the first time roll the pavement—that is not rolling the foundation; that is rolling this binder course and the top mixture—what will happen is that the two will be blended together and one will go down into the other. The top will be forced right down into the bottom or binder layer, and you will have a single layer, and this composite pavement, one mass—not two any more but just one—will be densest at the top. And the patent specifies that the only way you can get that is by failing to roll that binder course until you put the top course on. At page 1, lines 64-5, this is what it says: "-- in a thin coat or layer over the course B laid as before described but not

compressed or subjected to pressure or tamping.” On page 1, lines 70-72, the patent specifies that the materials comprising the binder course B and the finishing course C are subjected “to initial pressure or compression, preferably by moving a heavy roller over the same.” And again, on page 2, at line 8, and on page 1, line 111, the patentee points out and disclaims as part of his invention anything where the binder course is rolled, in this manner: “In this connection it will be appreciated that the single compression of the whole mass simplifies and cheapens the production of the pavement, and instead of preventing or interfering with the adherence of the upper course to the lower course (as is the case when the lower course is rolled or otherwise pressed precedent to the application and pressing of the upper course)”, etc. And on page 2, line 26, the patent again reiterates that course C is added to course B “before compression”. At page 2, line 53, it is again stated that the course is laid “without compression”, and at line 60 that the course is pressed “and thereafter blended and bonded with the lower course by compression”. Now, the file wrapper, which we will take up on argument, we contend limits this patent precisely to what the Patent Office gave them. This application was rejected six times by the Patent Office, until it was pointed out most frankly by the attorneys for Wallace that the thing that he had done and that Warren had not done, and that these other men had not done, that were cited by the Patent Office, was that he left this binder course unrolled and thereby got a

different result, got something different from what you would get if you rolled the binder course before you put this top finish dressing on, and on that understanding, the specifying of that result, which Wallace said you could not get in any other way, the Patent Office granted this patent.

Now, let us see what the County of Fresno does. I have an unmarked copy of the specifications that constitute Exhibit 5 to this complaint, and I have opened it at page 14 where this Type A specification begins. This specification, Type A, relates to the part of the pavement which composes the binder course and the finishing material, and the foundation, of course, is any foundation and it is specified elsewhere in the specifications what that foundation shall be like. Now referring to this wearing surface, Type A, the first item provides for what they call cleaning surface; the second is a binder course. Counsel has intimated that there was something wrong in the conduct of Fresno County in using these specifications and proportions for its binder course. That was the very thing we were entitled to do, your Honor, because these were the very specifications of the old expired Warren patent for a binder course. They are just exactly what was free to the public with the expiration of patent No. 727,505; so the binder course was within our rights, no question about that.

Now passing to the finishing course: The finishing course counsel has stated is a copy of his specifications. I think counsel mis-stated himself there, because it can be compared with the finishing mixture that War-

ren Brothers have in their Type B specifications and will be found to be entirely different. The proportions of the mineral aggregate and the cement are different; the grades are different; and these proportions and these grades were made up by Mr. Jensen, the county surveyor of Fresno County, and put in here, and were not acquired in any manner from Warren Brothers. Now it provides, looking at paragraph (f) on page 15, positively, that the binder course shall be given a compression before the finishing mixture is placed thereon; and when you do that it is our contention that- -

MR. EVARTS: Pardon me; you said "impression"; you mean the initial compression.

MR. L. S. LYON: Yes; the first compression that the binder course gets is placed there before there is any surface mixture put on. Now we contend that when you do that you have gotten outside of what the Patent Office would allow Wallace, as shown by his application and the file wrapper thereon; you have gone outside of anything that Wallace invented, as shown by the prior art, because everything that we do was old long prior to Wallace.

Now this specification specifies, on page 14, something that is entirely different from anything in the Wallace patent, and this is also Mr. Jensen's own material. It says: "The finishing course, after thorough compression, as hereinafter specified, shall be at least one-quarter inch in thickness." Now there we have on top of our binder course a separate layer one-quarter of an inch in thickness, and this layer is just

what we were entitled to put on and just what the attorney for Wallace told the Patent Office he didn't want. He wanted to get all of that material down into the binder course so that his pavement was densest at the top, and if you leave this quarter-inch on the top you haven't one compact integral layer made up of the material for the binder course and the finishing course, but you have two different and separate courses, and instead of the top being densest, as Wallace calls for, our quarter-inch finishing course is, as a matter of actual fact, of less density than the binder course. And that is merely an outgrowth of Warren's own proposition that sand will contain a greater percentage of voids than the graded mineral aggregate which is in his binder course.

It is also a fact that these same specifications call for asphalt wearing surface, Type B. Now this Type B appears at paragraph 16-a. These were the Warren specifications, and these were the ones that were not used on the Blackstone Avenue job which is here in controversy. The complaint is that we infringed the patent by using a certain pavement on a certain part of Blackstone Avenue in the County of Fresno. It was perfectly proper and perfectly true that when we asked for bids we had both types of pavement. We asked for bids on both types—Types A and B—and we were entitled to ask for bids on Type B. If we wanted to we could have gone ahead and used Type B, because Warren Brothers had filed their offer of the license. But when the bids came

in the board of supervisors of Fresno County, for reasons fully sufficient to *thsmeeelves*, decided that the better pavement and the more practical pavement for Fresno County was Type A, and therefore they used Type A pavement, which we contend is not in any way an infringement.

Now there is no odium attached to the fact that we asked for alternate bids. That is the customary thing, or quite a frequent thing, in connection with Warren Brothers' own business. In the case of *Evans vs. Warren Brothers* in the Third Circuit Court of Appeals, reported in 240 Fed. at page 696, the specifications adopted by the State of Pennsylvania called for alternate bids, and one of them was Warrenite; and when the bids came in the State chose the other form—not Type A, which was a different type—called Filbertine in that case, as I understand it, and then Warren Brothers turned around and sued them for using Filbertine, and I suppose they put in all these facts about the license—they are all in the opinion of the court here—and the court held that that did not make any difference; that the question was whether Filbertine was an infringement and not how many licenses there might have been on some other type. And that is what we have here. They filed this license agreement, and the board of supervisors did not accept it. They took this Type A proposition, and they are proceeding on the theory that this pavement incorporates only what was already a matter of record before Wallace came into the field, and as Wallace specifies in nine places in

his patent and all through his argument to the Patent Office that the thing that he invented was failure to roll that binder course, thereby getting a new result, when we go contrary to that we are going right back to what Wallace himself admitted was old.

It has been stated here that the question is whether or not these specifications are an infringement of the patent. Now of course the specifications cannot be an infringement of the patent. The thing that would have to be an infringement would be the thing that was laid, and anybody that participated in the laying of it would be an infringer if the thing as laid infringed the patent. The *latent* law goes to making, using and selling. It doesn't say anything about writing specifications.

We have, of course, admitted on the stand, or right in the stipulation, that this pavement for Type A on Blackstone Avenue was laid in accordance with these specifications, but it is significant that these specifications mention minima; they do not require that you only use so much; they say that you can use what you want provided you come within certain minimum propositions. Now if we have this situation in the case—which we do not admit—say that rolling it by a one-ton roller infringed the patent and rolling it by a two-ton roller did not, why, of course, that is a ridiculous thing. If that is all there is to this patent it was not valid in the first place, it seems to me. Now the question is whether there is any rolling or no rolling. But if our specification said a one-ton roller as a minimum that you can use, then our specifications would not be

an infringement, and the road would not necessarily be an infringement by just proving the specifications because it doesn't show how much more rolling we did than that; we might have used a fifty-ton roller, if there is such a thing, and still follow the specifications.

Now the facts in this case, as we shall show, are that our specifications call for a minimum rolling of three tons, which is plenty of rolling—just absolutely what Wallace said to the Patent Office he did not invent and did not want and would not do his work. Our specifications said a three-ton roller, but, as a matter of fact, when we came to make the pavement which is alleged to infringe, we used identically the same roller for rolling the binder course before the surface mixture was put on as we used for rolling the surface mixture after it was put on, and that same roller was a 12-ton roller. There was no distinction made at all as to how the binder course and the finishing course were rolled. They were both rolled with the same roller and that follows the specifications. We conformed to everything in the specification, and that does not infringe the patent in any way; so we agree with counsel's statement that if those specifications require an infringement of the patent when we stipulate that we followed the specifications our pavement would be an infringement. But if the specifications do not require an infringement of the patent, whether or not we infringed depends on how we did it. That would just follow as a matter of course, it seems to me. And so, for that reason, we are presenting

evidence as to just how that pavement was laid, just what it was like; we have the samples here in court, and we rely on three fundamental tests in our pavement over the Wallace patent. In the first place we rolled by a 12-ton roller our binder course before we put our finishing course on; in the second place we get, as a result, a different pavement. We have a finishing course one-fourth of an inch in thickness which is entirely distinct and is not blended with the binder course; and the reason that is not blended is because we roll the binder course, and Warren, in his patent, states that if you do roll the binder course you will not get it blended—and you won't. Now the last reason is that the patent in suit was only allowed in the Patent Office when they put into their claims, as a last stand, a statement that by following that particular process of failing to roll the binder course they got one integral mass which was densest at the top. Our pavement is not, as a matter of actual fact, densest at the top.

Mr. Nensen's affidavit as an expert in the case points out the reasons why, on behalf of Fresno County, he wrote up these Type A specifications. He considers that failing to roll that binder course is bad practice. He considers that it is the wrong thing to do, that you do not want all your top mixture forced down in there because then you will have rocks coming through to the top; you will have your seal coat broken; you will have an uneven thickness of mixture in there between all those rocks, which are just raked over and not rolled, and that will start your

pavement to working and to travelling, and, therefore, he, as an absolute condition to the Wallace patent, goes back and does just exactly what Wallace says not to do and just exactly what was always done ahead of Wallace.

Now if I have made myself clear on what the defenses are in the case we will proceed with the introduction of our proofs.

We offer in evidence, to show the prior art, - -

MR. EVARTS: Mr. Lyon, pardon me. You have pleaded in your answer some sixty-eight anticipation patents. In your statement I do not understand that you have mentioned any anticipations that you intend to introduce evidence on except the Warren patent. If you do expect to introduce any evidence would it not be consistent with your ideas of the proprieties of the case to tell us in your statement?

MR. L. S. LYON: Yes; I think that is only fair, Mr. Evarts.

MR. EVARTS: I think so.

MR. L. S. LYON: You see, we are not so much concerned with whether this Wallace patent is valid or not. All we are concerned with is showing that what we are doing is just what was done ahead of the Wallace patent.

Now in the first place we offer in evidence patent No. 88,139, to J. P. Cranford, issued March 23, 1869.

MR. EVARTS: Of course we interpose the objection on the ground that it is entirely incompetent, irrelevant and immaterial and the patent in question

fails to show any anticipation. It is a formal objection, and I suppose the ruling will be reserved --

THE COURT: The objection is overruled.

MR. L. S. LYON: I would like to suggest that you begin with about M in those patents, Mr. Clerk.

(Cranford patent filed as Defendant's Exhibit M-1.)

MR. L. S. LYON: Now this patent, of course, is to show the fundamental characteristics of pavement construction long prior to anything Wallace invented --

MR. EVARTS: This is not an argument at this time, is it?

MR. L. S. LYON: No; I am explaining the purpose, that is all.

MR. EVARTS: Well, it is offered in evidence, and I suppose the explanation will come as a matter of argument.

MR. L. S. LYON: Sometimes the court likes to know what we are putting them in for when we put them in so that it can judge the testimony.

THE COURT: Yes. Go on.

MR. L. S. LYON: This patent shows a base composed of stones A in the drawing and the bituminous composition B filling the surface crevices.

Now that forms a base, like the Wallace patent says there can be any base. Upon this base is laid an intermediate course C which is composed of broken stone mixed with sand and bituminous material. Now that corresponds with the binder course of the Wallace patent, except, of course, it does not show the identical graded aggregate that was laid in the Warren patent, but it shows the binder course on the

base, and then it shows, on top of that, a finishing course D which the patent states is a finer material than the intermediate course C and of compressed gravel, sand, etc., mixed with bituminous material. Now the patent states that the top course D is to be rolled even and solid. We contend that that shows the fundamental principle. It is an old patent. Just to show how much of this was old, it shows the fundamental principles of the base with the binder course on it and the top course with the mixture of gravel, sand and bituminous material rolled onto the binder course.

Now the next patent that we offer in evidence is No. 375,273, granted December 20, 1887, to Edward J. DeSmedt, as Defendant's Exhibit M-2.

MR. EVARTS: We interpose the objection that it is entirely incompetent, irrelevant and immaterial, not responsive to any of the issues, and not tending to show any anticipation as far as the patent in issue is concerned. The same objection, if your Honor please, will apply to all of these offers?

THE COURT: Yes.

MR. EVARTS: By stipulation.

THE COURT: Overruled.

MR. L. S. LYON: This DeSmedt patent describes a base A which it states is made of hydraulic concrete. Of course hydraulic concrete is cement concrete. It is just the same thing as we use on the state highways here. Then the patent states that upon this base is laid a binder course B; then the binder course B is stated -- page 1, lines 81-3 -- in the patent to con-

sist of: "I may use gravel and sand mixed together, or a combination of broken stone, gravel and sand, when the same is coated with the bituminous compound." Now there is the same idea of a binder course. Of course it does not have just the particular grading of aggregate that was involved in the Warren patent, but it is the binder course in the Wallace patent. And the patent goes on, at page 1, lines 90-1, and states that "The top or wearing course, C, is composed of refined Trinidad or other suitable asphaltum, heavy petroleum, or the residuum of petroleum, fine sand, and powdered carbonate of lime, mineral dust, or any other finely-divided mineral material." Now that mixture is just what we put on the top course of our finish. That Mr. DeSmedt had a good understanding of the theories of these pavements is shown by his patent. He describes exactly what a binder course is for. On page 2, lines 11-20 of his patent, we find this:

"The advantage of pavement laid in the manner described is that the bituminous matter employed in cementing the broken stone of the middle or binding course, B, will cause the wearing surface of top layer, C, to adhere, thus forming a solid or comparatively solid mass, which increases the strength of the pavement and at the same time will be pliable enough to prevent the cracking of the surface layer."

This DeSmedt patent, we contend, shows the three-layer patent pavement that is in the Type A speci-

fications, and we think it is a pretty good anticipation of our pavement.

(A recess was thereupon taken until two o'clock p. m.)

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AFTERNOON SESSION.

2 o'clock.

THE COURT: Proceed, gentlemen.

MR. L. S. LYON: At this time we offer in evidence Patent No. 391,222, issued October 16, 1888, to Amzi L. Barber, as Defendant's Exhibit M-3. This Barber patent describes a base, a binder course, and a finishing course, and it specifies that the base shall be an hydraulic base as distinguished from an asphalt concrete base, that is to say, that it shall use what we call hydraulic cement in place of asphalt; but it goes ahead and describes the binder course. At line 53 your Honor will find a reference to the binder course—or, rather, beginning at line 44: It says:

“The second or binder course is composed of clean broken stone or gravel, not exceeding one and one fourth inch in largest dimensions, the stone to be heated in any suitable manner and mixed with No. 4 coal-tar, distillate in the proportion of about one gallon of the distillate to one cubic foot of stone. This binder-course is spread on the base or foundation course to form a layer of about one and one-half inch in thickness when properly rolled or compacted.”

And then, beginning at line 62, it mentions the top course:

“The top or wearing surface or course is next placed upon the binder course, and is to be about one and one-half inch in thickness when compacted. This top or wearing surface is composed of refined Trinidad or other suitable natural asphaltum, heavy petroleum, or the residuum of petroleum, and fine sand.”

And at line 80 it specifies as follows:

“The materials and combination of materials forming each layer or course of the pavement, except the first one of broken stone, are laid while in a heated condition, so that the second or binding course is joined or cemented to the base or bottom course and the top or wearing course is cemented to the intermediate or binding course, and in this manner I produce a pavement which will be solid in all its parts and capable of withstanding the action of water and the expansions and contractions incident to thermal changes.”

Now we contend for that patent that it shows our proposition of a base, a binder course on the base and a finishing course on top of that, the three courses bonded together; that it shows that what was new with Wallace over this particular patent was merely the fact that Wallace put the top finishing course on before the binding course had been rolled, and that when we roll our binder course we go back to these old prior patents.

The next patent that we offer in evidence is the one which the court has heretofore considered, that is, No. 727,505, to Warren. That is offered as Defendant's Exhibit M-4. I think I have explained that that shows the exact binder course on a base that the defendant uses and shows a mixture for the top course C. There is a little difference between the mixture, perhaps, of this particular Warren patent and the mixture which we put on our binder course in Type A in that in our Type A finishing course we take and mix the gravel and the oil together as they did in this Barber patent and as they did in the De Smedt patent, and then put them on, while in the Warren patent he prefers, he says, to just put the asphalt on in a sheet and then throw the material on top and roll it in, the difference between the two being that in one case you get the rock and asphalt and mix them in a can together and then put them on the pavement and in the other case you put the asphalt down and sprinkle the mixture over it. Of course the prior art showed both forms.

Now the next patent we wish to offer in evidence is an English patent issued in 1887, No. 17,483, to Julius Boulton, and we offer this as Defendant's Exhibit M-5. This patent, referring to the drawings, shows a pavement comprising a base A, a binder course B and a finishing course C. The patent states that the base is to be made with hydraulic concrete. The binder course is made of a mixture of bitumen and broken stone, gravel and sand. That gives the bottom base and the binder, and then it also shows

the finishing course C, and the patent states that the finishing course is composed of bitumen and finely-divided mineral material, which of course is what we use in our Type A construction. This patent also states clearly the fundamental principles of construction of our Type A pavement when it says:

“The bituminous matter employed in cementing the broken stone of the middle or binding course B will cause the wearing surface or top layer C to adhere, thus forming a solid or comparatively solid mass which increases the strength of the pavement and at the same time will be pliable enough to prevent the cracking of the surface layer.”

That shows the three-course pavement, as we contend; and we contend that it leaves nothing for Wallace to invent except the rolling of course B, the binder course.

Patent No. 675,430, granted June 4, 1901, to Frederick J. Warren, we believe is a most pertinent patent, and believe that it alone shows all of the things that were employed in our Type A pavement. That is offered as Defendant's Exhibit M-6.

In that patent, referring particularly to the bottom figure of the drawings, the court will see a base, then a binder course C, and then a top course E. Now the binder course is specified in the patent; but with particular reference to the top course E, that is specified on page 2, at line 30, where it says:

“The surface of the roadway may or may not be covered with a thin coating of bituminous

mixture of sand, gravel, screenings, or gravel mixed with coal tar or other equivalent material.”

There is another example of what we had in the DeSmedt and Barber and Boulton patents in the way of adding to the Warren binder course a previously mixed mixture of Bitumen and finely divided mineral material to form a top or finishing course. That patent differs from Wallace, and Wallace differs from this patent, in respect to the fact that in this patent the binder course C is rolled before the top course E is put on, and the patent office cited this patent when the Wallace application was involved, and required Wallace to limit his patent to a non-rolling of the binder course, as we will show.

Now of course it would be almost a matter of choice as to how thick this top finishing course was. The Wallace patent describes that it shall be laid on when the binder course is not rolled and then impressed into the binder course so that it becomes a part of it. It states that only a thin mixture shall be put on. Mr. Jensen does not follow the Wallace patent in that respect, because he maintains a distinct quarter-inch. Insofar as Mr. Jensen's quarter-inch is thin, it is merely the same kind of course as was specified in that last Warren patent when Warren also says that his top course will be thin. There is nothing new in making the top course thin.

On that point we refer, in addition to the Warren patent, to patent No. 748,248, granted December 29, 1903, to William Wilson for a roadway, which I will offer as Defendant's Exhibit M-7. This patent to Wil-

son calls for a surface course 7 in the drawing, and this surface course is described as follows at page 1, lines 83-5:

“A thin top dressing 7 of a bituminous substance mixed with sand, stone screenings or the like.”

There we have the teaching of mixing up a *think* mixture of bitumen and finely divided mineral matter and spreading it on as a top dressing in a thin coat—whatever “thin” means.

Now it has been stated in some of the affidavits in this case on behalf of plaintiff that the Type A specifications provide that we shall put our top course on while the binder course is still hot, as having in some way intruded on the Wallace patent. In connection with the patent I am now to offer I want to simply state that the Wallace patent does not state anything at all in any way or give any hint as to when the top course should be put on. It does not say it must be put on immediately or while the binder course is *not*. If there was an invention of that kind in Wallace's patent it would be void because he failed to mention it at all. In other words, his being entirely silent on when the top finishing course should be put on, and as to what temperature there should be when it is put on, that cannot be considered as part of his patent. But insofar as we put our top course on while the binder course is hot we are following patent No. 768,699, granted August 30, 1904, to Schutte, which I offer as Defendant's Exhibit M-8. In this patent, particularly at page 1, line

42, Schutte particularly specifies that the spreading of one layer upon another should be performed while the lower layer is still hot; so that that was a well-known expedient in the art, to put it on when the other is hot, in order to make them stick together.

We have stated heretofore that we are not concerned materially with the validity of the Wallace patent because we do not use it, but for the information of the court as to whether or not there is anything new in failing to roll the lower course we refer to the fact that a patent was issued to J. H. Amies, No. 932,941, on August 31, 1909, about coincident with the issuance of the Wallace patent - -

MR. EVARTS: Well, it was after the Wallace patent, was it not?

MR. L. S. LYON: I think it was filed before the Wallace application in suit was issued.

MR. EVARTS: No, I don't think so. It was, anyway, granted after the Wallace patent, so that I do not think any reference to that would be proper. We have our objection and ruling made which applies to all these patents; but to this particular offer we make the further objection that the application was filed and particularly the patent was issued after the patent in suit.

MR. L. S. LYON: The Wallace patent was issued May 31, 1910, and this Amies patent application was filed on May 1, 1909, and patent was issued August 31, 1909, about nine months before the Wallace patent.

MR. EVARTS: The patent was granted, however,

after the Wallace patent, and of course while the application was in the Patent Office it was not at all public property.

MR. L. S. LYON: We do not rely on it seriously, except to show to the court that another man just at the same time, in connection with another pavement, was putting things on and rolling them together instead of rolling the courses separately. It is not material, as we do not use it. We can introduce it under that rule that where there is shown to be a simultaneous development of the same thing the court will consider that it was not any great, remarkable invention to think of doing it, otherwise a number of people would not have thought of doing it at the same time. There are a number of decisions to that effect. We do not urge it seriously as an anticipation. I don't think it makes enough difference, in view of the extreme pertinency of the other patents, to be worth much of a contest on. It may simply be marked for identification, as far as we are concerned.

THE COURT: Well, what do you want to do with it?

MR. L. S. LYON: We will formally offer it.

MR. EVARTS: And we object to it on the ground that this patent was issued after the Wallace application.

THE COURT: The objection will be overruled. (Patent filed as Defendant's Exhibit M-9.)

MR. L. S. LYON: Now the final patent that we wish to offer is a patent which was issued to this same inventor, Mr. Edwin C. Wallace, in 1916. This

patent, as we understand it, differs from the one in suit only in prescribing certain slight differences in the compositions of the courses—in the proportions of the rock, etc.—but it has in it a very pertinent statement of Mr. Wallace that bears on the patent in suit. It is a repetition and shows that after this pavement had been out for some time Wallace still recognized the same proposition, and that was that if you rolled the bottom course you would not get the results which he claimed to the Patent Office were new with him; that is to say, if you failed to roll the binder course until after you had spread the top course on then the top course, when the first rolling came, would be shoved down into the binder course and they would all be made into one integral mass and blended together as the Wallace patent says. Now Wallace said to the Patent Office that that would not happen if you rolled the course, and therefore he said these patents I have shown to the court were not anticipations because there the binder course was rolled. In this patent 1,183,507 that I want to offer, on the first page, at lines 105-110, it states:

“The application of the top course C to lower course B before the latter is compacted is essential to my process as otherwise the blending of the two courses as above described cannot be accomplished.”

We offer this as Defendant's Exhibit M-10.

MR. EVARTS: We object to it as entirely incompetent, irrelevant and immaterial and not responsive to any issues in this case. It was pleaded by the de-

endants as an anticipation, and it is now offered for some other purpose, and I cannot conceive yet what the purpose is. It is a patent granted six years after this one was granted.

MR. L. S. LYON: It was not pleaded as an anticipation, Mr. Everts. I have stated to the Court that we offered it to show a statement of the patentee in connection with the claim of his present patent in suit and also in connection with his affidavit which is on file in this case.

MR. EVARTS: I may be mistaken, but does it not occur in your answer as one of the patents that you plead in anticipation?

MR. L. S. LYON: Now I would not want to contradict you without looking it up. It should not have been in there if it is. (Examining pleadings.) No, I don't think it is, Mr. Everts.

MR. EVARTS: Possibly I am mistaken. I thought I was. But still, for all that, I think my objection is well taken.

(Court examining patent offered.)

THE COURT: What is the purpose of it?

MR. L. S. LYON: This is a patent to the same patentee as the one in suit, and we offer it in connection with his expert affidavit in which he refers to certain blending, and we offer it particularly as to the effect of his statement appearing at those lines I have mentioned, in which he states that if you roll the lower binder course before you put the top finishing course on they will not blend; because in this case we roll the lower course before we put the top

course on. The claim of the patent calls for it being blended, and we contend that ours is not blended at all, and so, as part of our case, we offer the sworn statement of the inventor in this case to the effect that when we roll we do not blend.

MR. EVARTS: Of course, reading just what the counsel has stated, it says "before the latter is compacted". Then it becomes a question of whether this first layer was compacted.

THE COURT: The objection is overruled.

(Patent filed as Defendant's Exhibit M-10.)

MR. L. S. LYON: Now so far as I am at present advised, that completes the prior patents we want to offer in evidence. We would like at this time to offer in evidence, pursuant to a stipulation entered into in the case, a book on "The Modern Asphalt Pavement", by Clifford Richardson, a director of the New York Testing Laboratory. This book was published in 1905, and copyrighted, and is a copy that we have obtained from the California State Library.

MR. EVARTS: We object to it on the ground that it is entirely irrelevant, incompetent and immaterial, and not responsive to any of the issues in this case. We have a stipulation that they do not have to prove the foundation of the book.

MR. L. S. LYON: We offer it under the rule that a prior publication may be received to show the state of the art.

MR. EVARTS: But that rule is within some limits: provided it describes something that is in issue in this

case, and we submit it describes nothing that is in issue in this case.

MR. L. S. LYON: Then I will explain to the court what we are relying on. This book is regarded as the standard authority on pavements generally; the book tells how to construct pavement of every kind here involved. Chapter 1 is devoted to the base; it tells all about the base, how to make it, and everything else. Chapter 2 is headed "The Intermediate Course", or, in other words, the binder course which we use in our Type A specifications. A number of chapters after that refer to the surface mixture, and then Chapter 19 is entitled "The Street", and directs the manner of laying the whole pavement; and the entire volume is complete with details for proportions and selections and materials; and then, finally, as Chapter 21, the author presents a briefing of standard specifications, stating:

"For the construction of an asphalt which is to meet the requirements of ordinary traffic in a majority of our cities the following, in the author's opinion, will be found to be not only satisfactory to the city but to the contractors who are to do the work."

When it comes to the argument we would like to point out the fact that almost everything in our Type A pavement is included in Mr. Richardson's book. In other words, we offer the book to show, in connection with the patents, the state of the prior art, ahead of Wallace, to show what he possibly could have invented.

MR. EVARTS: It seems to me that to make that

book pertinent counsel should show some place in it where the top course is put on hot and then rolled, or he should show that the book provides for an initial rolling of the binder course, without which, where the top course is put on and then finally rolled,—there is nothing in there; in other words, that will show anything as to the claims upon which our patent was granted.

MR. L. S. LYON: We contend that the book shows everything that we have incorporated in our pavement, and we will attempt to show exactly what Wallace has in his patent, and that the things it does not use are the very things we do not use, to wit, what is mentioned by Mr. Evarts, the failure to roll the binder course.

Now, beginning at page 3—just to show the pertinency of the book—here is a statement:

“An asphalt pavement consists essentially of a base or support or surface which is to carry a traffic, itself supported by the soil, and a surface consisting of a mineral aggregate cemented together with asphalt to protect the base from wear and disintegration, between which is commonly interposed either a course of broken stone coated with bitumen, known as binder, or some substitute for it.”

There Mr. Richardson has, right on the third page of his book, outlined the three layers that we have in our Type A pavement, to wit, the base, the binder course and the surface mixture. Now as to the base, on page 6 Mr. Richardson says:

“Base of most varied character has been used in

the construction of pavements, including broken stone, with or without a coating of more or less bitumen or coal tar, macadam, old cobblestone pavement, and old surface of granite blocks or blocks turned and reset, old brick or asphalt-block surfaces, and hydraulic concrete of natural or Portland cement of varying thickness."

And at pages 24-5 he goes ahead and describes the binder course. We want to show that all these things were well-known, and here was a book telling how to lay them and all of it.

Beginning at pages 24-25 Mr. Richardson states:

"The weakness of the ordinary open binder course, when subjected to heavy traffic, can be avoided by filling the voids in the material with fine stone or grit and the remaining voids, after this addition, with their sand or a mineral aggregate corresponding in grading to that of a standard surface mixture."

Mr. Richardson was there describing the warrenite binder of the patent which has now expired, which patent was then in force, the binder which we use on our Type A specification.

Now referring to the only other thing we have in our pavement, the top finishing course, Mr. Richardson describes that at page 27 of his book, in which he says:

"The asphalt surface, which directly carries the traffic and which is intended to withstand the wear and tear of the same and the action of the elements, is composed of a mineral aggregate and an asphalt cement, that is to say, it is an asphalt mortar or concrete.

"The mineral aggregate consists of sand, in exceptional cases also of stone, and a fine mineral dust or filler."

There are the three courses, specifying all the materials that we use. Now it seems to me that that is perfectly pertinent to show the state of the art at that time, and I think it will be very helpful to the court, if the court cares to examine the book, to show just what was known and embodied in the publication as a standard treatise as far back as 1905.

THE COURT: I suppose the court could read that if it were not in evidence, and therefore it can read it if it is in evidence. What difference does it make? It will be admitted.

(Book filed as Defendant's Exhibit M-11.)

MR. L. S. LYON: Now on April 22 in this case this court entered an order on a petition to the effect that the expert evidence in this case be set forth in the form of affidavits. The plaintiff filed affidavits and the defendant filed affidavits. The first affidavit we would like to present is that of Mr. Jensen, county surveyor of Fresno County, who prepared these specifications and if I may state some of the substance of this affidavit and read the parts we rely on, and then with the court having what is in the affidavit before him, we will offer Mr. Jensen for cross-examination. The affidavit reads:

(Reads Chris P. Jensen affidavit.)

(Mr. F. S. Lyon appears at this point as counsel for defendant.)

MR. L. S. LYON: Then Mr. Jensen goes ahead

and describes the patent in suit, and I will not stop to read it, because it covers practically the same ground as I have stated to the court in my opening statement, to wit, that the patent describes a base A, and a binder course B, and a surface course C, and that there is no description of the kind of finely-divided material matter utilized in course C.

That completes the affidavit of Mr. Jensen; and we offer the affidavit and the exhibits referred to there in in evidence; and Mr. Jensen will please take the stand for the purpose of cross-examination.

MR. EVARTS: I would suggest that you may read any other affidavits you desire to and we will proceed with the cross-examination later.

THE COURT: Why take the time to read them now? Why not read them during the argument?

MR. L. S. LYON: We were going to produce the affiants for cross-examination. I don't know how the court could follow the cross-examination without first considering the direct examination.

THE COURT: Well, can't you state substantially what it is?

MR. L. S. LYON: I think I can, your Honor.

THE COURT: All right.

(Mr. L. S. Lyon reads and states substance of depositions of Messrs. Leyden and Slayter.)

MR. EVARTS: I would suggest that you get all your evidence in and we will withhold our right of cross-examination—

MR. EVARTS: If your Honor please, at this time we do not care to cross-examine. There might

be some question before we finally conclude the case, but we don't care now to cross-examine.

THE COURT: All right.

MR. L. S. LYON: Then that is defendant's case at this time, if your Honor please.

— — — — —
R E B U T T A L.
— — — — —

MR. EVARTS: If your Honor please, I will read the affidavit of George H. Perkins as briefly as possible.

(Begins reading of affidavit.)

We have attached to this affidavit Exhibit B which indicates that, and we ask to have it introduced in evidence.

(Resumes and completes reading of deposition.)

And we introduce at the same time these exhibits, all of them, that are attached to the affidavit.

(An adjournment was thereupon taken until November 9, 1921, at ten o'clock A. M.)

—————oOo—————

LOS ANGELES, CALIFORNIA, WEDNESDAY,
NOV. 9, 1921. 10 A. M.

(Appearances: Messrs. Evarts, Head and Hornberger, for plaintiff; Messrs. F. S. Lyon and L. S. Lyon for defendants.)

"Patent No. 691,708 to Mallette, and No. 683506 to Mallette and Seyboldt, offered and admitted as defendants' Exhibits M-12 and M-13.

THE COURT: All right.

(Patents filed as Defendant's Exhibits M-12 and M-13.)

MR. EVARTS: At the conclusion on yesterday, if your Honor please, plaintiff had finished the affidavit of Mr. Perkins. We would like to call Mr. Perkins to the stand at this time.

MR. L. S. LYON: We object to any further testimony of experts except by way of cross-examination, your Honor. That was the order of the court, and Mr. Perkins' testimony was direct testimony and was put in in affidavit form, and acting on that understanding we filed our affidavits, under the ruling of the court, based upon Rule 48. The rule entered was that all testimony of experts in this case, so far as their direct examination was concerned, should be put in in affidavit form, and the affidavits were filed by both parties. Now we do not see any need and do not feel that it is proper to have further expert testimony in view of that rule.

MR. EVARTS: In the first place I do not think counsel's objection is pertinent at this time, for counsel does not know whether this is expert testimony or not. Our position is that we wish to put Mr. Perkins on. Some of his testimony may or may not be expert testimony, and as to other parts of it there is no question about it being expert testimony.

MR. L. S. LYON: I though you just said you wanted to put on further expert testimony.

MR. EVARTS: If I did I used the word inadvisedly. I want to put him on, and when the tes-

(Testimony of George H. Perkins.)

timony comes on you can take it up at that time and discuss the question of its character.

THE COURT: Well, put him on. There is no doubt that that was the intention, that these expert witnesses should testify by way of affidavit, and that rule will be adhered to.

MR. EVARTS: Take the stand Mr. Perkins. I have some exhibits I wish to introduce that—

GEORGE H. PERKINS,

called as a witness on behalf of plaintiff, in rebuttal, being first duly sworn, testified as follows:

DIRECT EXAMINATION,

BY MR. EVARTS:

MR. EVARTS: We will refer to the affidavit as far as Mr. Perkins' qualifications are concerned, and as to his residence, and so forth,—the preliminary questions.

Q I show you a photograph and ask you what that is, Mr. Perkins (handing photograph to witness).

MR. L. S. LYON: We object to the question on the ground that it is incompetent, no foundation laid.

MR. EVARTS: If he knows.

MR. L. S. LYON: On the ground that it is expert testimony and must be a part of the prima facie case and not rebuttal.

THE COURT: The identification of a photograph is not expert evidence; that is certain. The objection is overruled.

MR. F. S. LYON: Exception.

Q BY MR. EVARTS: What is that, if you know?

(Testimony of George H. Perkins.)

A. This is an enlarged photograph of a cross-section of a sample taken from the work laid by Thompson Brothers on Blackstone Avenue, part of route 5, section A, for the County of Fresno.

MR. L. S. LYON: Now we object, if your Honor please, and move to strike out the testimony of the witness on the ground that he is an expert witness; he is a man in the East, and if this is any question of fact, that it is mere hearsay on his part. He doesn't show that he knows anything about that sample at all.

THE COURT: He has taken a photograph.

MR. F. S. LYON: All right. Let him offer the photograph.

MR. EVARTS: We offer this in evidence at this time.

MR. F. S. LYON: Now we object, further, on the ground that it is incompetent, no foundation laid, not identified; and upon the further ground that the witness is not qualified to answer the question, and on the further ground that it is not rebuttal, and that it is in the nature of expert testimony, in abrogation of the rule.

THE COURT: Let's see what it is.

(Last question and answer read.)

Q. BY THE COURT: How do you know it is?

A The photograph was made at the laboratory of Warren Brothers Company, East Cambridge, Massachusetts, at my direction and under my supervision.

Q How do you know it is a sample taken from that particular place?

(Testimony of George H. Perkins.)

A The sample was taken by—

Q I didn't ask you that; how do you know it is a sample?

A By the identification memorandum that I received from—

THE COURT: The objection is sustained. The foundation has not been laid.

MR. EVARTS: All right; we will call the other witness. I thought this was one that he took from a sample.

THE COURT: All right.

Q BY MR. EVARTS: I will show you three enlarged photographs and ask you what they represent, if you know (handing pictures to witness).

MR. F. S. LYON: We object to that on the ground that there is no foundation laid, the witness not having qualified to answer the question.

MR. EVARTS: I would state that these gentlemen are merely—

THE COURT: Wait a minute. Just keep calm.

MR. EVARTS: I am thoroughly calm, but I just wish to—

THE COURT: All right; now don't get excited. Now start in all over again.

MR. EVARTS: All right. If your Honor please, I mean to be calm. I was merely stating to the court what these consisted of, and they are simply enlargements of photographs that are attached to his affidavit, and are enlarged sizes, that is all, and I thought they were more useful to the court.

(Testimony of George H. Perkins.)

THE COURT: If they are merely large-sized photographs attached to his affidavit, that is entirely different.

MR. EVARTS: That is it.

MR. F. S. LYON: They don't need to be proved, then.

MR. EVARTS: I will have to, in some way or other, show what they are, by someone.

THE COURT: If they are enlarged photographs that can be very easily ascertained, and if they are I don't suppose there is any objection to them.

MR. F. S. LYON: None whatever.

MR. EVARTS: All right.

THE COURT: Submit them to counsel and let us see.

MR. L. S. LYON: That is apparently what they are.

THE COURT: All right.

Q BY MR. EVARTS: I show you another photograph and ask you what that is, if you know.

MR. F. S. LYON: We object to that on the ground that there is no foundation laid.

THE COURT: Overruled.

MR. F. S. LYON: Exception.

A This is a photograph of Blackstone Avenue.

Q By MR. EVARTS: Was it taken in your presence?

A It was; on October 30, 1921. The view is taken from Hedges Avenue on Blackstone Avenue looking south towards the city.

(Testimony of George H. Perkins.)

Q Does that cover the work in dispute here?

MR. F. S. LYON: We object to that on the ground that it is not rebuttal, and is part of the prima facie case.

MR. EVARTS: I haven't offered it yet; I am just ascertaining whether it covers the work or the portion of the work that is in dispute here.

THE COURT: Objection overruled.

MR. F. S. LYON: Exception.

A It shows—

Q BY THE COURT: Well, does it cover the work in dispute?

A It does.

Q BY MR. EVARTS: What else, if anything, does it cover?

MR. L. S. LYON: Now we object to his stating anything about what it shows. That would be expert evidence. He can state that that is the piece of pavement they bring the suit on. That is a fact, I suppose. But when he goes into discussing what it shows, we object to that.

MR. EVARTS: That has already been asked and answered and the objection was overruled once, Mr. Lyon. You didn't hear your father on that.

MR. L. S. LYON: Exception.

A It covers, in the foreground, a portion of the work laid for the County of Fresno under Type B specifications. The background, to the right of the joint shown in the center, is work laid under the Wallace patent for the City of Fresno. The back-

(Testimony of George H. Perkins.)

ground, on the left side of the joint, shows the entire area of the work in the city, part of route 5, section A, laid under Type A specifications.

MR. L. S. LYON: We object to the testimony of the witness and move to strike it out on the ground that he does not know how the work was laid except by somebody telling him.

THE COURT: That does not appear. The objection is overruled.

MR. L. S. LYON: It appears from his affidavit, I think, your Honor. His services were in Boston, and he is telling us that he saw this just a few days ago. Now this pavement was laid in the early part of this year.

Q BY THE COURT: When was this photograph taken?

A October 30.

THE COURT: Well, this was taken just a few days ago. The objection will be sustained as to what it represents. It is not within his knowledge, apparently.

MR. EVARTS: He was present when that photograph was taken.

THE COURT: When the photograph was taken? All right. That is all he knows about it. The balance of it will be stricken out.

Q BY MR. EVARTS: I show you another photograph and ask you what that represents, Mr. Perkins (handing photograph to witness).

MR. F. S. LYON: We object to that as incom-

(Testimony of George H. Perkins.)

petent, no foundation laid, the witness not having qualified to answer the question.

Q BY MR. EVARTS: Did you take that picture?

A This picture was taken by me October 30, 1921, on Blackstone Avenue, Fresno, looking south toward the city of Fresno, showing in the background two ruts in the pavement caused by traffic. The portion of the picture—or the pavement shown in the picture is of Type A specification.

MR. EVARTS: We offer that in evidence.

THE CLERK: Do I understand that these enlarged photographs are offered as separate exhibits, or just to be used in connection with the exhibits themselves?

MR. EVARTS: Just in connection with the exhibits themselves, I would think.

THE CLERK: This last one will be Plaintiff's Exhibit No. 9; the others are enlarged photographs of Exhibits A, D and E.

MR. EVARTS: Now, gentlemen, these are samples from which the photographs are taken, which photographs are annexed to this witness's affidavit. Do you want me to lay any further foundation for them?

MR. L. S. LYON: You might just compare them.

MR. F. S. LYON: Those are the exhibits to the affidavit, are they, Mr. Evarts?

MR. EVARTS: Yes, Mr. Lyon.

MR. L. S. LYON: If you are just offering these for the purpose of showing what those exhibits in Mr. Perkins' affidavit were taken from, we have no objection to them.

(Testimony of George H. Perkins.)

MR. EVARTS: That is all I am offering them for.

MR. L. S. LYON: It seems to me they should have been filed as exhibits with the affidavit. We filed ours as exhibits.

(Samples filed as Plaintiff's Exhibits 10, 11 and 12.)

Q BY MR. EVARTS: I will show you a piece of asphalt and ask you if you know where that came from (handing exhibit to witness).

A I do.

Q Whereabouts?

A It came from the work laid by Thompson Brothers under Type A specifications on Blackstone Avenue, Fresno, laid January 7, and the sample cut the following day, January 8.

MR. L. S. LYON: We object to that and move to strike out—

Q BY MR. EVARTS: Did you take that out yourself—

THE COURT: Wait a minute.

MR. L. S. LYON: All right. In view of the question.

Q BY MR. EVARTS: Did you take that out yourself?

A No, sir.

Q Were you present when it was taken out?

A No.

Q. You were not present?

A No, sir.

MR. L. S. LYON: We move to strike out the testimony of the witness with regard to it.

(Testimony of George H. Perkins.)

THE COURT: The answer will be stricken out.

Q BY MR. EVARTS: In the affidavit of Mr. Jensen filed in this case reference has been made to the words "density" and denseness", and I will ask you if there is any distinction.

MR. L. S. LYON: Now we object to that on the ground that that surely is expert evidence. The order entered by the court provided that these people could file rebuttal affidavits to Mr. Jensen's affidavit if they desired, and gave them time to do so. Now they did not file any; they rested on the affidavits as theretofore filed by them, and surely this is expert evidence for a man to testify in regard to what constitutes density and the difference between density and something else.

THE COURT: Let us see the order.

MR. L. S. LYON: And that follows the rule. The rule provides that both rebuttal and direct expert evidence shall be taken in that manner.

MR. EVARTS: Before your Honor rules I wish to be heard on that matter just briefly.

THE COURT (After examining order) All right.

MR. EVARTS: Now, if your Honor please, this matter is very important to this plaintiff's case. The patent provides that it shall be densest at the top, and the affidavit of Mr. Jensen is that it is not densest at the top "because the aggregate of the finishing course, being composed of sand, necessarily contains a higher percentage of voids". They then introduce an affidavit here showing the specific gravity to be greater in the case of the binder course than the finishing course.

(Testimony of George H. Perkins.)

Now what I wish to say is that the definitions of "dense" and "density" are more or less different, and the word "density" is not used in our patent, and that word "dense", by the dictionary itself, is given a different meaning. Now that is the fact, and that fact I wish to prove by this witness, to illustrate the fact by certain experiments that he has made, and show the experiments. For instance, they have taken sand of the same size as is in here, and have taken sand and material of the same size as is in the binder course, and by means of phials, have shown how quickly the water goes through it, showing that, as a matter of specific gravity, it has a greater density, the binder course, because the voids are smaller—they are more dense. Now how am I going to get this before the court except to prove, as I am offering to do by this witness, a general explanation of what appears, as a matter of fact, in the dictionary itself, showing these different definitions? The definition that they have followed is true, in a sense, but the definition that we are following and have followed when we used the word "dense" and not "density" is true; and I have samples that simply illustrate the truth. Now even if this rule should be invoked—and I admit that I do not understand this rule applies to all testimony—I thought when the rule was submitted to me that it applied to the testimony as to the general outline of the patent itself and expert testimony as to whether or not these were infringements to the extent of the difference between this and other patents, and that it does

(Testimony of George H. Perkins.)

not refer to all of this testimony. Now we have this man here; they have the right to cross-examine him, and if we are going against any rule we certainly do not want to take counsel by surprise, and they would have, with our consent at least, the right to reply in any manner. But this is not, really, a question of expert testimony when the court considers it in the light that appeals to me at least. It is a question of fact. It is a question that appears as a matter of fact, but does need some method of distinguishing, and the method we have adopted to distinguish is to show. For example, if your Honor please, here is a preparation that has been made by this witness (exhibiting). They have the same gravity. Now which is the more dense? Why, of course, this one, because the voids are just as many, but they are smaller individual voids. And the same specific gravity applies there. Now that is according to the line we have illustrated in this patent. That line is made as defined in the dictionary. There is a distinction drawn between counsel's claim that it is a specific gravity matter—both definitions appear there—but this is the definition that we have illustrated in a paving way. Now I have the same thing where we take the same size sand and where he says that where there are more voids there is less density. Now we have proved by the water test—

THE COURT: Well, you are not talking about what is before the court, Mr. Evarts. The question

(Testimony of George H. Perkins.)

is why did you not comply with the rule. Now that is the only question before the court.

MR. EVARTS: Well, you can take it that we did not know enough to do it, or that we did not construe the rule as your Honor did—or as it should have been construed, rather—pardon me—but however it is I assume the court wants to hear the entire facts of this case. I assume that if we have been ignorant in the matter your Honor doesn't want to have our clients suffer from our ignorance when the whole matter is before the court and everybody is going to have a fair, equal show to present the matter upon its merits. Is this expert testimony, if your Honor please?

THE COURT: Oh, yes.

MR. EVARTS: Well, hardly, when I prove the difference by the dictionary itself.

THE COURT: You don't need to prove anything by the dictionary. The dictionary proves itself, just the same as any witness.

MR. EVARTS: Then it is a fact that I wish to illustrate by this witness by experiments that he has made.

THE COURT: I do not think you have complied with the rule, but I am going to let the evidence in. I want to know all about this case. The objection is overruled. Go on. Let us get the case tried.

MR. F. S. LYON: Exception.

(Last question read.)

A There is a decided distinction. The dictionary points out that in some senses "density" and "dense-

(Testimony of George H. Perkins.)

ness" are synonymous. For instance, if you were speaking of the density of population of a ward of the city you could equally well say denseness of population there, the meaning in that case being the degree to which the people making up that population are crowded together. On the other hand, in a technical sense, density and specific gravity are synonymous in physical experiments, because density in physics means the amount of matter per unit of volume, and as physical experiments, measurements are made in the metric system in which the unit of weight is one gram, the unit of volume one cubic centimeter, and, due to the fact that one cubic centimeter of water weighs one gram, then, necessarily, the specific gravity, which is the ratio of the weight of a substance to the weight of an equal volume of water, must be numerically the same as the density which truly is the weight or mass per unit of volume. For instance, in the metric system any substance which has a density of 10 means that one cubic centimeter would weigh 10 grams. Again, if you took the specific gravity in the metric system you would find that that substance is ten times as heavy as water, because one cubic centimeter of the substance weighs ten grams while one cubic centimeter of water weighs one. Therefore, numerically, they are the same. But density and denseness are only synonymous in figurative senses, and denseness is never synonymous with specific gravity.

Q BY MR. EVARTS: Well, in reference to the

(Testimony of George H. Perkins.)

percentage of voids and density, where the individual voids are smaller in size, are they more dense where they are smaller in size, or are they larger?

MR. F. S. LYON: We object to that and all this line of testimony on the ground noted in the preceding objection; and it will be understood that our objection covers the whole line of this expert testimony?

THE COURT: Yes.

MR. F. S. LYON: And to this particular question we object on the ground that it is immaterial.

THE COURT: The objection is overruled.

MR. F. S. LYON: Exception.

(Last question read.)

A The smaller the size of individual voids the more dense the substance, even though the total combined volume of all these small spaces might be a greater percentage of the volume of the body or structure referred to than in a case where the individual air spaces or voids were fewer in number but individually larger in size. For example, it is easier to pass water through a large hose than through a small hose, or a hole of any size.

Q BY MR. EVARTS: I am showing you two cans or tins. What are they, and in what way do they illustrate the testimony you have just given?

A These are two exhibits used by me in an experiment a few months ago. In the larger one the holes are one-half inch square, the bars between the holes are also one-half inch in width. In other words, the bars are, in each case, the same width as the

(Testimony of George H. Perkins.)

width of the opening between the bars. Due to that fact the area of holes is twenty-five per cent of the total area of the screen. For comparison with that, this is a 200-mesh screen, in which there are 200 holes to the lineal inch in each direction, and the diameter of the wire used in this sieve is the same as the width of the opening between the wires, therefore the two sieves are truly comparable to the area of holes in each case.

Q By "holes" that would mean the same as voids in this paving proposition, would it not?

MR. F. S. LYON: That is objected to as leading and suggestive.

Q BY MR. EVARTS: I will ask you whether it would or not.

A It would.

Q Now which of those two is the more dense?

A The 200-mesh sieve was proven to be more dense by this experiment. In an endeavor to pour water into the half-inch sieves it naturally went through as fast as you could pour it in. In the case of the 200-mesh sieve I poured water in it until it was filled to the brim, and it remained there all the afternoon, until someone touched it and the water went through.

MR. EVARTS: We offer those in evidence for the purpose of illustrating the witness's testimony.

MR. F. S. LYON: They are objected to upon the same grounds as with reference to the testimony.

THE COURT: Objection overruled.

MR. F. S. LYON: Exception.

(Testimony of George H. Perkins.)

(Sieves filed in evidence as Defendant's Exhibit 13.)

Q BY MR. EVARTS: I am showing you a box of stones and ask you to explain *that* they represent and are, by way of illustrating your testimony.

A These consist of four blocks of bituminous mixtures in which the percentage of voids in the mineral aggregate, before adding the bitumen, is substantially the same.

Q That is, the percentage of voids in those is practically the same?

A The variation is 39.97 per cent of voids in this three-quarter inch stone sample, total volume, and the least percentage of voids was, in this, 38.71 per cent of the total volume, this being the finest aggregate mixture of the four.

Q Now let us get this into the record. You are now referring to the one that— Suppose you mark this "A".

(Witness places mark on exhibit.)

Q You are referring to "A," and that is what?

A This block referred to as "A" is composed of 92 per cent. by weight, of 50-mesh sand and 8 per cent of asphalt cement. Before adding the bitumen the voids in the mineral aggregate were determined and amounted to 38.71 per cent.

Q Now the one marked "B"?

A The sample marked "B" is composed of 96.5 per cent of 10-mesh limestone and 3.5 asphalt cement; voids determined in the mineral aggregate before the addition of the asphalt cement, 39.001 per cent. The

(Testimony of George H. Perkins.)

sample marked "C" consists of 96.77 per cent of $\frac{1}{2}$ -inch limestone, 3.23 per cent asphalt cement, the voids in the mineral aggregate, before adding the asphalt, being determined at 39.89 per cent. Sample marked "D" is composed of 97 per cent of $\frac{3}{4}$ -inch limestone and 3 per cent asphalt cement. The voids were determined in the mineral aggregate before adding the bitumen and found to be 39.97 per cent. The object of making these samples was to show the comparative size of the individual voids by looking at the vertical sawed cross-section in which it is seen that the larger the individual particles in the aggregate the larger the space or voids between sand.

Q Which is the more dense, then?

A It is obvious from a visual examination that the denseness of the samples increases as the size of the individual particles diminishes, which causes the size of the individual voids or air spaces between the particles to diminish in like ratio. The samples also show the denseness, visual in the texture of the surface of each of these four samples. Notwithstanding the fact that the total percentage of voids in the mineral aggregate, of these samples, is the same—that is, within the small variation of less than one per cent—still, the smaller the particles used in the aggregate the greater the degree of compactness of the texture of the surface. That is, the particles are more closely crowded together, making the surface more compact and thereby more dense.

Q Now referring to these samples, which one of

(Testimony of George H. Perkins.)

these would more nearly represent the binder course in Type B pavement and which would more nearly represent the top course?

MR. F. S. LYON: We object to that on the ground that it is incompetent, the witness not having qualified to answer the question.

MR. EVARTS: I think the qualifications are pretty well shown, as far as that is concerned, from his affidavit.

THE COURT: The objection is overruled.

MR. F. S. LYON: Exception. The witness has not, so far as I can remember, shown that he has any actual personal knowledge of the laying of the pavement here in question.

THE COURT: Well, the question does not embrace that.

MR. F. S. LYON: I thought so.

THE COURT: Counsel did not ask him anything about the pavement here in question.

MR. EVARTS: No, sir.

MR. L. S. LYON: Didn't the question say something about Type A?

THE COURT: Yes, but that has nothing to do with the question here; that is as to the type.

MR. EVARTS: None of these samples strictly duplicate either of the mixtures specified in Type A.

A Now as I understand your question, you ask me which most nearly resembles the binder course.

Q BY MR. EVARTS: The binder course and the top course.

(Testimony of George H. Perkins.)

A Sample D, composed of a $\frac{3}{4}$ -inch limestone 97 per cent and asphalt 3 per cent. most nearly resembles the structure of the binder course specified by Fresno County Type A specifications, it being understood that a binder course as specified therein consists largely of that size stone. Sample A, which is composed of 92 per cent of 50-mesh sand and 8 per cent of asphalt cement, is the one which most nearly approximates the finishing course mixture specified by Type A specifications, Fresno County.

MR. EVARTS: We offer this box with the four pieces marked A, B, C and D for the purpose of illustration of the witness's testimony.

(Box and contents filed as Plaintiff's Exhibit 14.)

Q BY MR. EVARTS: Mr. Perkins, I now show you a set of glass tubes filled with sand and water and ask you to illustrate with that this question of denseness and density. Was that made by you or under your immediate direction? You are familiar with it, are you?

A This combination of bottles and framework and their contents was prepared under my supervision and direction at our Los Angeles laboratory during the past ten days. The apparatus consists of a framework and five glass U-tubes as nearly as possible $\frac{3}{4}$ -inch internal diameter, and the length of each length of U-tube approximately 7 inches, they being what is known in commercial laboratories as 7-inch U-tubes. In order to more clearly show than by definition the relative denseness of mineral aggregates the particles of which

(Testimony of George H. Perkins.)

are larger in one case than in another we filled tube A up to the point as shown, using 100 grams of 10-mesh sand. That filled the tube to approximately $3\frac{1}{2}$ inches from the base of the tube and left approximately 5 inches from the sand to the top of the tube. In this case the sand all passed the 10-mesh screen but did not pass the 20-mesh screen. In other words, it was composed of uniform sized particles, which will give approximately 40 per cent of voids. In the second tube we placed a similar amount, namely, 100 grams, of sand, which passed 50-mesh screen but did not pass 80-mesh screen. Thus this tube contained uniform sized particles but smaller than the tube A. The percentage of voids in this was also practically 40 per cent. In tube C we placed a similar 100 grams of sand particles, all of which passed 100-mesh screen but did not pass 200-mesh screen. This, being composed of uniform sized particles, also contained practically 40 per cent of voids in its total volume. We then had these three tubes filled—

Q By the three tubes you mean A, B and C?

A A, B and C, containing each 100 grams of sand, the only difference—may I change the wording of that just a little? In these three tubes the weight of the sand in each case was 100 grams. The volume of sand in each of these three tubes A, B and C is the same as shown by the level of the sand in the tubes. The percentage of voids in the mineral aggregate in each of these three tubes A, B and C was the same as shown by test. We then proceeded to

(Testimony of George H. Perkins.)

fill one leg of each U-tube with water, and we found that in the case of the 10-mesh sand in tube A the water passed through the sand at such a rate that in one minute the water was at the same level in both sides of the U-tube. In the case of tube B, this required 25 minutes. That was with the 50-mesh sand. In the case of the 100-mesh sand in tube C, 89 minutes were required for the water to pass through until it was the same level in both legs of the U-tube.

Q Now I understand that in all three of those the percentage of voids was the same, practically so?

A It was practically so. The variation might be one or two or three per cent.

Q And the only difference there was the size of the individual particles of sand?

A That was the only difference as far as the sand was concerned, but as far as this experiment is concerned, and what is much more important, the size of the individual air spaces between the particles of sand was different in each case and was the largest in the 10-mesh sand and smallest in the case of the 100-mesh sand and intermediately between the two, of course, the 50-mesh sand.

Q But the percentage of voids in the sand was the same?

A The total percentage of voids was the same. That is why. In the 10-mesh sand there were relatively few voids of relatively large individual size, and in the tube C, of 100-mesh particles, there was a very large number of voids. Each of those voids was so very

(Testimony of George H. Perkins.)

much smaller that the total combined volume of all of these small spaces in each case totalled the same volume.

Q And in one case, of the 10-mesh sand, which was the largest, it took how long—a minute?

A One minute.

Q And the smaller size sand, or C, it took 89?

A 89 minutes in the smallest one.

Q Go ahead now.

A For comparison with these we then filled U-tube D with the same volume of graded sand as was used in the other three tubes. By graded I mean that we used a sand of a screen test in accordance with the type A specifications and in accordance with the screen test found by us when analyzing a portion of the finishing course mixture used on Blackstone Avenue, Type A specifications. Now we determined the percentage of voids in that mineral aggregate and found that it was naturally less than in the other cases on account of being graded and the smaller particles fitting in between the larger particles. By actual test we found the percentage of voids in that aggregate was approximately 30 per cent, consequently we had to use a greater weight in this tube to make the same volume as in the others. I cannot remember just offhand the number of grams that we used in this tube, but they were as much greater than 100 grams as 30 per cent would be to 40 per cent. We then filled one leg of this tube with water and found that it took very much longer than the 100-mesh particles

(Testimony of George H. Perkins.)

required for the water to pass through to the same extent, and I was forced to leave the laboratory before the completion of the test, so I cannot state how much longer, but it was considerably longer than in the case of the 100-mesh. We then took another U-tube—

Q This one was marked what?

A This one was marked "E", fastened on the end of the box there,—I filled it to the same volume with some very finely divided mineral matter, all of which would not only pass a 200-mesh screen but would also have passed a very much finer screen if such a screen was available. The 200-mesh screen being the smallest one that was made, therefore I don't know the exact size of the particles in that tube. However, they were very small, and by making the void test we found that the voids were slightly over 50 per cent, although in the case of these uniformly sized particles in the other case they were 40 per cent. This was similarly filled with water, and we found that that took very much longer than the graded aggregate, tube B, which had been made up in accordance with the screen test obtained by analysis of the finishing course mixture from Blackstone Avenue, type A specification work.

MR. EVARTS: We offer these glasses in evidence, if your Honor please, and ask that they be marked Plaintiff's Exhibit No. 15.

Q Now what about the water in that last tube? Your testimony didn't cover how long or what condition—

(Testimony of George H. Perkins.)

A It took very much longer. It took several hours to pass through until there was about one-fourth inch difference in level in the two sides of the U-tube. Now at that time we were forced to drop it, and I don't know at what time in the night it actually reached a uniform level.

Q Which of those samples is the most dense as shown by this test? -

A I beg pardon?

Q Which of those samples in those tubes is the more dense as shown by this water test?

A The final tube, marked "E", containing the most finely divided material, took the greatest length of time, therefore the material in that tube is the most dense and corresponds with—the denseness increasing inversely as the size of the individual voids between the particles.

Q I am showing you three tubes and ask you to explain those in reference to your testimony. Was that experiment made by you and under your direction?

A It was. These three blocks were made under my supervision and direction at East Cambridge, Massachusetts. The three blocks were formed by taking a sample of sand and determining the percentage of voids in the sand and also the specific gravity of the sand, before we started to produce any one of the blocks. We then added to the sand in one case sufficient paraffin wax to fill the voids and compressed them into that block. That is the greasy block. In the second case, of the black block, we used the same

(Testimony of George H. Perkins.)

volume of sand and the same volume of asphalt cement as was used of sand and paraffin wax in the previous block. In the third block, which is white in color, we used the same volume of sand and the same volume of liquid composed of litharge and glycerin. After the preparation of the three blocks it was obvious that the denseness of the three blocks must be identical because we had used the same size particles of mineral aggregate in each case; the mineral aggregate contained the same total percentage of voids in each case; the size of the individual voids between the particles was the same in each case; and we had then used in the preparation of the blocks the same volume of sand and the same volume of filling material or liquid; therefore the voids between the particles of sand must be equally well filled in all three cases. In other words, we felt we had produced three blocks of equal denseness. We then took the specific gravity of the three blocks and found that while the specific gravity of the sand with which we started was 2.65 the specific gravity of the block using paraffin was less than 2.0. The one in which asphalt cement had been used, the specific gravity was greater than 2.0, but still less than the specific gravity of the original sand. The specific gravity of the one in which litharge and glycerin had been used as a filling medium was over 3.0. In other words, we were confronted with three blocks which we knew to be equally dense but which gave three decidedly different specific gravities.

MR. EVARTS: We offer these three tubes in evi-

(Testimony of George H. Perkins.)

dence as illustrative of the witness's testimony and ask that they be marked Plaintiff's Exhibit 16, offering them as one exhibit.

MR. F. S. LYON: No objection except our general objection and exception.

THE COURT: They will be admitted.

(Tubes received in evidence and marked Plaintiff's Exhibit 16.)

Q BY MR. EVARTS: Now, Mr. Perkins, Mr. Jensen in his affidavit refers to the fact that in this patent that is in question, owned by these plaintiffs, there is nothing in the patent concerning the temperatures at which the courses are to be made. From the patent what would you have to say in reference to what governs that temperature?

MR. L. S. LYON: Now it seems to me, your Honor, that even the liberality shown by the court in allowing these experiments to come in should not go to the extent of allowing these witnesses to come in and now discuss the patent and what they think is in the patent when they had all of the time up to the time of this trial to make any such statements and could just as well have done it by affidavit as not. Mr. Jensen's affidavit was filed five or six months ago, and they had plenty of time in which to make these very same statements, and then we could have had a chance to consider them and answer them and prepare our case. We relied on the rule of the court and I do not see any justification whatever for going into this matter.

(Testimony of George H. Perkins.)

MR. F. S. LYON: Before the court rules I would like to say this, in fairness both to the court and to counsel: Your Honor will remember that you asked me in particular not long ago to assist this court in expediting the trial of patent cases. In this case the defendant has relied upon Equity Rule 48, which clearly requires the filing of all expert affidavits before the trial and within the time set forth, and we have followed that rule in this case in an effort to expedite these trials, and have relied thereon; and I might say, most respectfully, that we thought we would have the full co-operation of the court in attempting so to expedite them. It is for that reason that we raise that question at this time. What is to be the practice is vitally before the court in this ruling. There is no use in putting the parties to the expense of preparing expert affidavits and then allowing the experts to be brought into the case and testify in open court, both, and it is for that reason that I am asking your Honor to carefully consider that question of practice. I do so with the utmost respect and in the same good spirit in which your Honor asked me to expedite and assist the court to see if we could not find a way of expediting the trial of patent cases.

THE COURT: Well, from the patent the court is just as able to determine that as the witness is.

MR. EVARTS: That may be true. I will withdraw the question.

Take the witness.

MR. L. S. LYON: Of course this testimony is

somewhat of a surprise to us in the sense that we have not had a chance to check over any of these experiments. As at present advised we have no cross-examination, but if something develops we would like to have the privilege of recalling the witness after we have had an opportunity to consider the matter.

MR. EVARTS: That is all right. That is all, Mr. Perkins.

— —

(Affidavit of Edwin C. Wallace read in evidence by Mr. Honberger.)

MR. L. S. LYON: Now we move to strike out the last paragraph of the affidavit on the ground that it is a mere conclusion of law, stating that in his opinion it infringes the patent.

THE COURT: Yes, it is only his opinion.

MR. L. S. LYON: I don't suppose it makes any difference, but we make that objection now.

THE COURT: He can have any opinion about it he wants to.

MR. HONBERGER: We offer this deposition in evidence, your Honor.

MR. EVARTS: We offer Mr. Wallace for cross-examination if you desire.

MR. L. S. LYON: We do not care to cross-examine Mr. Wallace, and I will state to the court that our reason is expressed somewhat by the Circuit Court of Appeals in the case of v, 265 Fed. 900, in which it says that "The language which resulted from the cross-examination of an expert by the opposing lawyer was arid beyond belief.

No one read it, everyone was annoyed by it and someone paid for it." So we are trying to shorten this case as much as we can.

MR. EVARTS: Well, we have set you a good example in that and I am glad to see you follow it.

THE COURT: I hope it will become the constant practice.

MR. HONBERGER: If your Honor please, we have here some depositions of Charles Ashley, Arthur A. Adams, and Jacob E. Courtade. Shall we read these in evidence or consider them read and introduced?

THE COURT: You may consider them read and unless there is some particular reason why you want to read them now, and refer to them in argument as to what they may sustain.

MR. HONBERGER: We will offer them in evidence, then, and consider them read, your Honor.

THE COURT: They will be admitted and considered as read.

MR. HONBERGER: Will your Honor allow us a few minutes recess? We wish to take up the matter of our next witness. We have not determined upon the order in which we will put them on.

THE COURT: Yes. I want to finish this case today, however.

MR. HONBERGER: Well, I think we can finish it in another hour at the outside, or perhaps an hour and a half, as far as we are concerned.

THE COURT: How much have you, Mr. Lyon?

(Testimony of J. S. Burge.)

MR. L. S. LYON: At this time we do not know that we will have anything further.

THE COURT: All right. We will take a recess until 1:30 o'clock P. M.

(A recess was thereupon taken until 1:30 o'clock P. M.)

AFTERNOON SESSION

1:30 o'clock.

J. S. BURGE,

called as a witness on behalf of the plaintiff, in rebuttal, having been first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. EVARTS:

Q Please state your name.

A J. S. Burge.

Q Where do you reside?

A Huntington Park, California.

Q What is your business or occupation?

A I am with the Warren Brothers Company as an inspector.

Q And were you acting as such inspector in Fresno at the time what is known as the Thompson job was laid on Blackstone Avenue?

A Yes sir.

Q The piece that is in issue in this case. Did you take out a sample of the pavement that was laid by Mr. Thompson or by Thompson Brothers, the defendant here, on that work?

A Yes sir.

(Testimony of J. S. Burge.)

Q I will ask you if you sent the portion that you took out to Mr. G. H. Perkins.

MR. F. S. LYON: We object to that as not rebuttal, and also on the ground that it is solely laying a foundation for expert testimony and not for testimony of fact, in contravention of the order of the court requiring affidavits to be filed under Rule 48.

THE COURT: Objection overruled.

MR. F. S. LYON: Exception.

A I did, yes sir.

Q BY MR. EVARTS: How did you send it?

A I sent it by parcels post.

Q And how was it marked?

A It was addressed to G. H. Perkins in care of the Warren Brothers Company.

Q Was the piece itself marked?

A Yes sir.

Q How was that marked?

A It was marked by numbers to identify them.

Q Any papers or writing?

A There was a statement that the enclosed sample was taken from a part of Route 5, Section A, and this statement described the sample, and one-half of this—that was torn in two, and one-half of the torn statement describing the sample was enclosed with the sample, the other half being sent by mail to Mr. Perkins.

MR. EVARTS: Now with the court's permission I will withdraw this witness and put Mr. Perkins on the stand.

(Testimony of G. H. Perkins.)

G. H. PERKINS,

recalled by plaintiff in rebuttal, testified as follows:

DIRECT EXAMINATION

BY MR. EVARTS:

Q Mr. Perkins, I will ask you whether or not you received a piece of pavement from Mr. Burge marked by him as coming from the Blackstone Avenue job in Fresno County laid by Thompson Brothers?

A I did.

Q You know Mr. Burge's handwriting, of course?

A Very familiar with it.

Q And you received that piece. I hand you a piece of pavement marked "Sample of pavement" laid by Thompson Brothers on Blackstone Avenue, part of route 5, etc., and ask you whether that piece is a portion of the pavement that you received through Mr. Burge in the manner that you and Mr. Burge have stated.

A It is.

MR. EVARTS: We offer it in evidence.

MR. F. S. LYON: We object to it on each of the grounds stated in the last objection.

THE COURT: The objection is overruled.

MR. F. S. LYON: Exception.

(Sample filed as Plaintiff's Exhibit).

Q. BY MR. EVARTS: I show you three pieces more or less fastened together and marked "L. O. 68, Fresno County", etc. and ask you whether or not that is also from a piece that you received in the

(Testimony of G. H. Perkins.)

same manner and was a part of the piece that you received in the manner aforesaid?

A It is.

MR. EVARTS: We offer that in evidence.

MR. F. S. LYON: Same objection, and as incompetent, no foundation laid, not identified.

THE COURT: What do you mean by not identified?

MR. F. S. LYON: It may be a portion of it, as the witness says, but it is not identified as to whether it is in the same condition or character or not.

THE COURT: Well, the character or condition wouldn't change very much. The objection is overruled.

MR. F. S. LYON: Exception.

Q BY MR. EVARTS: I show you a sample here that is cut into three or four pieces and ask you if that is also a part and portion of the piece that was sent you by Mr. Burdge in the manner aforesaid?

A It is.

Q And at the time you received it was it cut into these three or four pieces that you see there?

A No, sir.

Q This was cut into those pieces by yourself or under your immediate direction?

A It was under my direction for the laboratory of Warren Brothers Company. These came from there.

MR. EVARTS: We offer them in evidence as Plaintiff's Exhibit No. 18.

(Testimony of G. H. Perkins.)

(Articles referred to received in evidence and marked Plaintiff's Exhibit 18).

Q Now will you take those apart and show the court the idea that you had in mind in cutting them to pieces that way?

MR. L. S. LYON: We object to the expert testimony, your Honor. He has identified these as what he has cut and as showing what he has done. Now that is as far as the fact goes.

THE COURT: The objection is overruled.

MR. L. S. LYON: Are we not entitled, under the ruling of the court, to know what these special claims are to be?

THE COURT: The objection is overruled.

MR. L. S. LYON: Exception.

Q BY MR. EVARTS: Just go into briefly.

A When we received that sample from Mr. Burdge the sample was cut into three pieces, one of which you had on your desk a moment ago, into this piece (indicating), and another one that Mr. Evarts has. This piece, after sawing vertically by means of an iron wire passing through emery—it was cut vertically on four sides; it was then cut horizontally into these three pieces while the other piece was cut into four slices horizontally. In cutting horizontally the saw naturally removed a layer approximately one-sixteenth of an inch thick, so that this original sample was one-eighth inch thicker than this when we received it. In cutting through here, removing that one-sixteenth inch layer, it cut through the course shown in the

(Testimony of G. H. Perkins.)

lower portion of the pavement referred to in the specifications as the binder course. This second cut passed through the center of the uppermost stones in the binder course, showing the portion of each of those uppermost stones in this middle layer, the tips of those stones remaining in this layer. The other sample, which was cut into four slices, the upper cut was made a trifle higher.

Q Yes. Well, I will introduce that in just a moment. And what was the purpose and object of that cutting?

A The purpose and object was to determine to what extent the finishing course composed of fine aggregate bituminous mixture had been forced down into the space between the uppermost stones in the lower course, and to what extent the two layers had been blended at their contiguous surfaces, and to determine to what extent those large stones of the binder course approached the surface of the pavement. In other words, our purpose was to show the extent of the blending and bonding of the two layers.

Q I now show you a sample cut into four pieces—the other was cut into three—and ask you if that is a part and portion of the piece of pavement that you received, sent you by Mr. Burdge in the manner in which you and Mr. Burdge have testified.

A It is

Q And were those pieces cut by you or under your immediate supervision?

A They were.

(Testimony of G. H. Perkins.)

Q And for what purpose; will you explain?

A In order to further investigate what we had started to do with the last sample presented. In this case we made four layers instead of three, making the bottom layer thinner than was done in the first case, to ascertain the extent of compression of the lower binder course. That is shown by the arrangement of these various stones in those two layers.

Q Now what does this lower piece represent? Is that the bottom or what?

A This is the bottom surface of the binder course of the Type A pavement, and rests upon the asphaltic concrete base referred to in the specifications.

Q This is the bottom of it that you have just shown the court here?

A That side belongs up there. This is the texture of the bottom of the layer.

Q And this is the first cut from that?

A This is the first cut at the bottom, showing all large stone. Passing upward, the next cut was made there, showing still the same characteristic aggregate of bituminous concrete mixture, showing the rigidity obtained by the interlocking of the coarse stones, and it will be noted that in the lower side of this layer the stones are slightly smaller than they are in that, but very, very slightly. Then when the uppermost cut was made, by examining the two sides of this next to the uppermost layer you will find the lower portion of that consists of very large stones while the upper side of it, approximately one-quarter inch above, has

(Testimony of G. H. Perkins.)

merely the tips of the stones pointing through. Then the lower side of this uppermost layer, which is really one-sixteenth inch above the upper surface of the second layer, contains merely the tips of the coarse stones from the lower layer, the upper side of this showing the texture of the finished pavement after thorough compression of the finishing course, the sample showing that, notwithstanding the initial compression of the binder course, the compression of the finishing course has been sufficiently thorough, and—

MR. F. S. LYON: We move to strike the statement of the witness as being a statement of his opinion, and under the order of the court we submit that we were entitled to notice of this testimony.

THE COURT: The objection is overruled.

MR. F. S. LYON: Exception.

A (Continuing) Showing that the final rolling of the finishing course has forced the fine finishing-course mixture of the specification into the spaces between the tops of the uppermost stones of the binder course and has actually produced a thorough blending and bonding of the contiguous surfaces of those two layers, the two layers being blended and bonded into one. The structure as I received it, before it had been cut horizontally at all, was a compact, rigid layer densest at the top.

MR. EVARTS: We offer this in evidence and ask that it be marked Plaintiff's Exhibit No. 19.

MR. F. S. LYON: We object to it on each of the grounds stated, to wit, that it is not rebuttal, and,

(Testimony of G. H. Perkins.)

further, that it is expert testimony required by Rule 48 and the order of the court to be submitted in affidavit form.

THE COURT: The objection is overruled.

MR. F. S. LYON: Exception.

Q BY MR. EVARTS: I show you a photograph and ask you if that was taken under your direction and your supervision and in your presence and so forth.

A It was.

Q And what is that a photograph of?

A This photographic print I have in my hand is an enlargement made in our laboratory of the life-size photograph taken in our laboratory under my supervision and in my presence of a sawed vertical cross-section of the sample which we received from Mr. Burdge as testified to a few moments ago.

MR. EVARTS: We offer it in evidence.

MR. F. S. LYON: We object to it on each of the grounds stated in the objection to the preceding question.

THE COURT: The objection is overruled.

MR. F. S. LYON: Exception.

(Photograph filed as Plaintiff's Exhibit 20).

MR. F. S. LYON: And the further objection to this photograph is that it is incompetent, no foundation laid.

THE COURT: Objection overruled.

MR. F. S. LYON: Exception.

MR. EVARTS: That is all.

MR. L. S. LYON: No cross-examination.

(Testimony of J. S. Burge.)

J. S. BURDGE,

recalled by plaintiff in rebuttal, testified as follows:

DIRECT EXAMINATION

BY MR. EVARTS:

Q I show you a photograph and ask you if that photograph was taken by yourself (handing same to witness).

A Yes sir.

Q And what does it represent?

MR. F. S. LYON: We object to that as not rebuttal.

THE COURT: Objection overruled.

MR. F. S. LYON: Exception.

A This shows a part of Blackstone Avenue. The immediate foreground in the picture here is Type D - -

Q Which is to the left?

A Which is to the left of the middle line, and that medium line there is type A.

Q And which is to the right?

A Type B.

MR. EVARTS: We offer this in evidence and ask that it be marked Plaintiff's Exhibit No. 21.

MR. F. S. LYON: Same objection.

THE COURT: Same ruling.

MR. F. S. LYON: Exception.

MR. EVARTS: I show you a small photo and ask you if that photograph was taken by you (handing same to witness).

A Yes sir.

Q Whereabouts?

(Testimony of J. S. Burge.)

A This was taken on Blackstone Avenue in Fresno.

Q Of the work that is in question here—or a portion of it, I mean?

A Yes.

MR. EVARTS: We offer this in evidence, as Plaintiff's Exhibit No. 22.

MR. F. S. LYON: Same objection.

THE COURT: Same ruling.

MR. F. S. LYON: Exception.

Q BY MR. EVARTS: I show you another picture and ask you if that was taken by you?

A Yes sir.

Q And what does that represent?

A That is a portion of the surface on Blackstone Avenue.

Q A portion of the work on Blackstone Avenue done under Type A specifications in this suit?

A Yes sir.

MR. EVARTS: We offer it in evidence.

MR. F. S. LYON: Same objection.

THE COURT: Same ruling.

MR. F. S. LYON: And, if the court please, it will be understood that this same objection will be made and exception taken and had to each exhibit offered on this line of evidence without the necessity of repeating it?

MR. EVARTS: We stipulate so.

THE COURT: Yes.

(Photograph filed as Plaintiff's Exhibit 23.)

(Testimony of J. S. Burge.)

Q. BY MR. EVARTS: I show you another picture. Was that taken by you?

A Yes sir.

Q What is it?

A A portion of the construction on Blackstone Avenue.

Q Laid by Thompson Brothers in this suit on Blackstone Avenue?

A Yes sir.

MR. EVARTS: We ask that it be marked Plaintiff's Exhibit 24.

Q I show you another photo. Was that taken by you?

A Yes sir.

Q And whereabouts? What does it represent?

A It represents a three-wheel roller used in pressing this pavement on Blackstone Avenue, and part of the compressed pavement.

Q Which is the compressed pavement?

A The foreground is the compressed pavement, or, rather, the east side of Blackstone Avenue—the immediate foreground.

MR. EVARTS: We offer it in evidence as Plaintiff's Exhibit No. 25.

Q I show you another picture. Was that taken by you?

A Yes sir.

Q A portion of the work laid by Thompson Brothers in this suit on Blackstone Avenue?

A Yes sir.

(Testimony of J. S. Burge.)

MR. EVARTS: We offer it in evidence as Plaintiff's Exhibit No. 26.

Q Now, Mr. Burdge, you stated, I believe, a moment ago that you were present when this work was done by Thompson Brothers that is in question here on Blackstone Avenue?

A Yes sir.

Q You were there watching this work on behalf of the plaintiff in this action, at their request and under their pay and employ and everything of that kind?

A Yes sir.

Q Now about that work, this binder course was laid hot, was it?

A Yes sir.

Q Now an exhibit has been introduced here by the defendant which I wish to call your attention to and which shows this roller, the kind and class of roller, —it shows, in fact, the roller that was used (handing exhibit to witness).

A Yes sir.

Q That is a good likeness of it?

A Yes sir.

Q And that consists of a wheel in front about how wide?

A 40 inches, or probably 48; I am not sure.

Q And the two wheels behind are about how wide?

A They are 24 inches wide.

Q Now I will ask you with reference to that roller how this binder course was by Thompson Brothers rolled before the top course was put on.

(Testimony of J. S. Burge.)

A It was rolled with a three-wheel roller.

Q With this particular three-wheel roller (exhibiting photograph)?

A Yes sir.

Q Well, they started to one side, didn't they?

A In rolling they started and make the first pass at the low side of the street, working toward the crown of the street.

Q As a matter of fact this only covered half of the street, did it not?

A Yes sir.

Q All right. They started on the side of the street with this roller and rolled up along the side?

A Yes sir.

Q Then how did they come back?

A The practice in using a—

Q I am asking you how they did it.

A Well, they came back, and the second time probably lapped or moved the roller over six to twelve inches.

Q Then they would go up on this side of the pavement with this roller and then move the roller towards the crown of the street six inches or a foot and go back?

A Yes sir.

Q And kept doing that until they got to the other side?

A Yes sir.

Q Did they go over it more than once that way—I mean from one side of the street to the other?

(Testimony of J. S. Burge.)

A In a few cases, yes. In general, no.

Q Then as a matter of fact the only rolling that this binder course had, some of it the roller only went over it once?

A Yes sir.

Q Now after this binder course would be rolled as you have described with this roller, how long after that before the top course would be put on?

A Immediately.

Q Well, immediately. How long?

A Oh, two minutes, or three minutes.

Q Within two or three minutes. Would that be right?

A Yes, I think so. That is about right.

Q And how hot was this top course at the time it was put on?

A The temperature was around 300 degrees Fahrenheit.

Q The temperature of the top course?

A Both of them.

Q And after this top course was put on tell me how it was rolled then?

A It was rolled in the same manner.

Q But to what extent?

A Oh, the rolling was continued, I should say, for an hour.

Q Over how much ground for an hour; what space?

A They would double over probably 75 or 100 feet.

Q They would roll that for an hour?

(Testimony of J. S. Burge.)

A Yes.

Q Now when they finished rolling this binder course I will ask you whether or not there would be any marks of the roller still showing on the binder course?

A No. They rolled until they—

Q I mean the binder before the top course was put on.

MR. F. S. LYON: We object—

A Oh, the binder.

MR. F. S. LYON: We object to counsel leading the witness.

MR. EVARTS: Oh, no; the witness didn't understand the question. I will withdraw the whole business and ask him once more.

MR. F. S. LYON: Let him describe it.

Q. BY MR. EVARTS: What was the condition of the surface as far as showing creases or the wheels of the roller or anything of that kind is concerned after this binder course was rolled in the manner you have stated?

A There were marks of the wheel.

Q Marks of what?

A Marks of the roller wheel.

Q And after this rolling where they did it for an hour over 75 feet, or whatever you said the dimensions were, what was the condition of that top then?

A It was rolled smooth.

Q Well, was it solid or not?

A It was thoroughly compressed.

Q Now what would be the condition of the surface

(Testimony of J. S. Burge.)

of this binder course—that is, not the top course but the binder course—after this initial rolling that you have narrated, as to its being smooth, or holes in it, or rough?

A It had superficial voids in it.

Q Well, what do you mean by superficial voids?

A Cavities.

Q In the top?

A In the top.

Q How long a time would you estimate the time to be between the time of the spreading of the coarse mixture and the spreading of the finishing course?

A About fifteen minutes.

Q After this final rolling was completed, of the top course, after it was thoroughly rolled, I will ask you whether or not the pavement was still warm or not—or what was the degree of temperature, rather?

A Oh, it still retained considerable temperature; probably above two hundred degrees.

Q I didn't qualify you as I should, probably, Mr. Burdge. You have been employed by the Warren people here in what capacity?

A As an inspector.

Q And for how long, about?

A Oh, about—Let's see. 19 years, say.

Q I show you a piece of pavement here on the bottom of which is a piece of wood that is marked "215" and ask you if you know where that came from.

A This came from Route 16, Section A.

Q What is Route 16, Section A?

(Testimony of J. S. Burge.)

A Fresno County highway.

Q Well, laid under what pavement?

A Laid under Type A specifications.

Q Did you take it out yourself?

A Yes sir.

Q And it has been in your possession ever since?

A Yes sir.

MR. EVARTS: We offer it in evidence as Plaintiff's Exhibit No. 27).

Q That was laid with Type A pavement, was it?

A Yes sir.

Q I show you one that is marked "211", I think it is. What is that?

A That is a piece from the same construction.

Q The same construction as the one you have just shown to me?

A Yes.

Q Type A?

A Type A; Route 16, Section A.

Q Not from the same place but from the same construction is what you mean—the same highway?

A Yes sir.

MR. EVARTS: We offer it in evidence as Plaintiff's Exhibit No. 28.

Q I show you one marked "215" and ask you where that came from.

A It came from the same construction.

Q That is, the same highway?

A Yes sir.

Q And it is Type A?

(Testimony of J. S. Burge.)

A Yes sir.

MR. EVARTS: We offer it in evidence as Plaintiff's Exhibit No. 29.

Q I show you one marked "320" or something,—whatever it is. Was that taken by you?

A Yes sir.

Q Where is that from?

A This was taken from Route 5, Section A, Thompson Brothers Type A construction.

MR. EVARTS: We offer it in evidence as Plaintiff's Exhibit No. 30.

Q I show you one marked "33" and ask you if you know where that came from.

A It came from Route 5, Section A, Thompson Brothers Type A construction, Fresno County.

Q You took it yourself?

A Yes sir.

MR. EVARTS: I offer it in evidence as Plaintiff's Exhibit No. 31.

Q I show you one marked "34".

A That came from the same construction.

Q Thompson Brothers construction, type A?

A Yes. Route 5, Section A.

MR. EVARTS: We offer it in evidence as Plaintiff's Exhibit No. 32.

Q I show you one marked "35". What is that—Type A construction?

A That is the same work.

Q Taken by you?

A Yes sir.

(Testimony of J. S. Burge.)

Q And by "same work" you mean Thompson's construction, type A?

A Yes sir.

MR. EVARTS: We offer it in evidence as Plaintiff's Exhibit No. 33.

Q I show you one marked "36". Was that taken by you?

A The same.

Q Thompson construction, type A?

A Yes sir.

Q Fresno County and everything.

MR. EVARTS: We offer it in evidence as Plaintiff's Exhibit No. 34.

Q I show you one marked "38".

A This is the same.

Q Taken by you?

A Yes sir.

Q Thompson construction, Type A?

A Yes sir.

MR. EVARTS: We offer it in evidence as Plaintiff's Exhibit No. 35. I have some others that I have of Type B that I want to put on another witness to identify.

MR. L. S. LYON: I want to cross-examine him—

MR. EVARTS: I will have to put this man back on again in just a minute. This man took these samples out of Type B pavement, your Honor.

THE COURT: Just go ahead with your cross-examination.

(Testimony of J. S. Burge.)

CROSS EXAMINATION

BY MR. L. S. LYON:

Q How wide was this Blackstone Avenue Type A job that you have testified about?

A It varied in width.

Q What were the different widths?

A One end of it was something like 12 feet; the other end was something like 20 feet, approximately, within a few tenths probably.

Q How long was it?

A About 600 feet. Six hundred and something.

Q Now you have stated that a portion of it was only rolled once by the roller. That is to say, the binder course was only rolled once. How much of it was only rolled once?

A That would be pretty hard to tell, because there would be a strip as the roller came in on the binder that would receive one compression, one passage of the roller, then as the roller backed off it would not strike it again, you see. That might happen. It did happen.

Q Well, it was only just that accidental strip by the movement of the roller; that is the only place where it only got one rolling, then; is that correct?

A Well, there are two sides.

Q Well, just the two edges, then?

A Yes sir.

Q And those were not more than six inches wide, were they?

(Testimony of J. S. Burge.)

MR. EVARTS: We object to that. That is not the testimony of the witness.

THE COURT: The objection is overruled.

A From six to twelve inches.

Q BY MR. L. S. LYON: How far did you say the roller lapped when it was started on its opposite course?

A Well, I said something like 75 feet.

Q I don't believe you understand me—

A Oh, excuse me. Why, from six to 12 inches.

Q Didn't you say six inches on your direct examination?

A I said from six to twelve.

Q Do you remember saying 12 inches on your direct examination?

A Yes sir.

Q Well, how far did it lap? You say it lapped from 6 to 12. How far did it lap as a matter of fact? Did you measure it?

A It varied between 6 and 12 inches I would say.

Q Did you measure it?

A No, not necessarily.

Q Just took a look at it?

A Yes sir.

Q Did you watch it down the whole length of that lap to see whether the roller was kept right straight ahead so as to maintain that exact width the whole length of the lap?

A It didn't maintain that. There were only parts of it that were 12 and 6 inches.

(Testimony of J. S. Burge.)

Q Some of that lap may have been completely covered over so that that portion of the edge received more than one rolling; isn't that a fact?

A It might, yes. It might happen. In fact there was one part of the street that was not rolled at all.

Q That the binder course was not rolled at all?

A Yes.

Q Or the surfacing course, or what part was not rolled at all?

A The binder course was not rolled at all.

Q What part was that?

A Well, it was a little corner toward the south end of the street where they didn't roll it.

Q How big a corner was that?

A Oh, a few feet. May be six feet square, or eight feet square. Just a little corner.

Q Do you know why that was not rolled?

A No, I do not.

Q Just what part of the pavement was that on? At what place in this—

A It was next to the railroad track, and, as I remember it without referring to notes, opposite house No. 1240 or '14. I am not sure. It was near—it was within—oh, 75 feet of the south end of the construction.

Q Now did any of these samples come from that piece?

A No sir.

Q Did any of these samples come from this 6-inch strip that was left?

(Testimony of J. S. Burge.)

A No sir.

Q Or the 12-inch strip?

A No sir.

Q None of them did?

A No sir.

Q Where did the samples come from?

A Well, I remember one that was marked 6½ feet out from the lower edge of the pavement. Now the other one was approximately that distance out, so as to get a fair—

Q Who gave you permission to take these samples up?

A I believe I didn't have permission myself.

Q Did you go right in after the pavement was done and cut out the portions out of the completed pavement?

A The next morning.

Q When nobody was on the job?

A They were there; yes sir.

Q Did they see you do it?

A Yes sir.

Q Didn't ask any questions?

A No.

Q You didn't have any permission at all?

MR. EVARTS: We object to this as entirely irrelevant. I don't see that it makes any difference.

MR. L. S. LYON: We are trying to find out as to the reliability of this testimony.

THE COURT: Well, it is interesting anyhow just to see how people do. The objection is overruled.

(Testimony of J. S. Burge.)

Q. BY NR. L. S. LYON: What was your answer that you were just about to give?

A I said I had no personal permission.

Q Well, who told you to get those samples?

A Our man in direct charge of the work in Fresno had permission from both the chief inspector and the contractor to take the samples.

Q Who was the chief inspector?

A Mr. Leydon.

Q Did Mr. Leydon see these specimens taken up?

A I think not. Now I am not sure about that. I can't say for sure.

Q This Exhibit 16, this piece of pavement, just where in that pavement was that removed from (handing exhibit to witness)?

A That is a part of a sample that was taken, I think, 189 feet north of the south end of the work. I think that was the location.

Q Yes, and in regard to the side of the pavement where was it taken?

A I said about six and a half feet.

Q From which side?

A From the low side of the pavement.

Q And there was nobody present when you took that up?

A There were at least three of us.

Q Who was there?

A Mr. Brough and Mr. Pope.

Q Both of them representatives of Warren Brothers?

(Testimony of J. S. Burge.)

A Yes sir.

Q What time of the day was it?

A Oh, in the morning.

Q At what time in the morning?

A I should say 6:30 *ot* 7 o'clock, something like that. I don't know.

Q Well, what is your best recollection as to what time you went out there—early in the morning before anybody was on the job?

A From six thirty to seven o'clock.

Q Before anybody was on the job?

O I don't remember whether there were any men there or not at the time we started. They were all there before we quit cutting the samples.

Q Who was there, now before you quit? Who saw you cut the samples besides these three men?

A I think C. M. Thompson was one.

Q Do you remember definitely that he was there?

A I am sure that he was there during the cutting of those samples—during the last cutting.

Q What do you mean by the last cutting? Were these all cut on one day?

A Sure. It took some time to cut them out too.

Q Now, where was the last sample cut from?

A There was a second sample cut about 278 feet or something like that north of the south end of this work.

Q And how far from the edge?

A Approximately six and a half feet, that I have mentioned. I wouldn't say—

(Testimony of J. S. Burge.)

Q Now who picked out the place that these samples were to be cut from?

A Well, I don't remember that there was any picking done, except one, and in that case a paper was spread on the base in order to make the sample come loose easily, you see, from the base.

Q Before the pavement was put down?

A Before the coarse mixture was laid, yes sir.

Q Now with those consent was that paper put down?

A Well, it was with the tacit consent of everybody present, because there was no objection to it.

Q Did you have any arrangement with the man that was spreading the binder course or the man that was rolling the binder course as to the fact that that particular piece was to have a piece of paper under it to be taken up?

A It was put down at random there, in certain locations.

Q Did the man running the roller know that the paper was there?

A He may have seen the paper put down, but he had no idea, I presume, why it was put down.

Q Do you know the man who operated the roller?

A I don't think so. No, I do not.

Q Never saw him before?

A Oh, I probably had, but then, to know him by name, no.

Q Had he ever done any work for Warren Brothers?

(Testimony of J. S. Burge.)

A Well, I don't believe any of Thompson's men ever did any work for Warren Brothers.

Q Who put the paper down there?

A Mr. Brough.

Q And was Mr. Thompson present then?

A I should— Well, I don't know. He might have been. He was on the job most of the time.

Q Was Mr. Leydon present when the paper was put down?

A I think so; yes sir.

Q Did you ask him about the paper?

A I said that I had no permission or no arrangement with anyone personally about the matter.

MR. EVARTS: The arrangement was made between Mr. Leyden and another one of the gentlemen, Mr. Lyon; I will tell you that.

Q BY MR. L. S. LYON: Will you state positively that you know that Leyden knew the paper went down there or saw the paper put down there?

A No, I wouldn't say so. I don't know.

Q Were you present when the binder course was rolled over this piece of paper?

A I was present on the job during the entire work. Now, whether—

Q What were you doing on the job? Were you working on it?

A I was in the employ of Warren Brothers Company, making observations of this work.

Q Did you in any way do anything on the work

(Testimony of J. S. Burge.)

that was being done besides put this piece of paper down?

A The paper was put down by Mr. Brough.

Q Was Mr. Brough present with you during all the time you were there?

A I don't think that he was present all the time, but most of the time.

Q Now while this binder course was being put down did you take any samples of the binder course?

A I did not, but Mr. Brough did.

Q Did you make any measurements of it to see how thick it was when it was put down?

A No sir. You mean measure the thickness?

Q The binder course; yes.

A No, I didn't measure the thickness, but I—

Q About how thick was it when it was put down?

A You mean before compression or afterwards?

Q Yes, before compression.

A Oh, probably something like two inches thick.

Q And how thick was it after compression.

A About an inch and a quarter, approximately.

Q Now did you rake over or in any way distribute or delve into this binder course while it was being put down between the time it was put down and when it was rolled?

A The stuff after it was raked?

Q Yes, or before it was raked.

A Never touched it; no sir.

A Did Mr. Brough?

A No sir.

(Testimony of J. S. Burge.)

Q Did anyone in your party?

A No sir; not to my knowledge.

Q Do you know the man that was distributing the binder course?

A Well, there were several of them there. A Spanish gentleman that I didn't know.

Q You didn't know any of them?

A No, I don't think so.

Q Who was in charge of where it was put and to see that the proper amounts were put down, of the binder course?

A I presume you might say Mr. Leyden.

Q Well, when Mr. Leyden wasn't there who was?

A In the absence of Mr. Leyden, why, I think there was another inspector, a resident inspector, on the job. Now I am not sure about that.

Q Well, do you know him at all?

A No.

Q Neither you nor anybody in your company had any pre-arrangement with anybody on behalf of the county or anybody in Thompson Brothers regarding the putting down of these papers and picking up these particular pieces; is that correct?

A I said that personally I had no arrangement with anybody; that that was attended to by Mr. Brough, the local man in charge of the work. Now I think I had better qualify that a little bit. I say in charge of the work; he was in charge of Warren Brothers inspection in Fresno county.

(Testimony of J. S. Burge.)

Q Now these pieces that are in exhibit No. 17, from what part of the work were they taken?

A Well, I presume they were taken from the Type A construction.

Q Well, you presume. Now just where were these pieces of Exhibit 17 taken from?

A I don't know.

Q You didn't take them yourself?

A I took two samples.

Q Well, didn't you identify a few moments ago that these pieces from Exhibit 17 were part of these samples?

A I didn't identify those pieces.

Q You don't know whether they are part of those samples or not?

MR. EVARTS: He has never testified that he did.

MR. L. S. LYON: I am asking him a question.

MR. EVARTS: He has testified that he took them and sent them back east.

A I took two samples and sent them east.

Q BY MR. L. S. LYON: You don't know whether these three pieces, Exhibit 17, are part of them or not?

A Not to my knowledge, no sir.

Q You only sent two pieces?

A There were two separate samples, and I think—yes, there were two pieces taken from each sample, sent east, or sent to Cambridge—or Boston, I think.

Q Now that makes four pieces that went east, does it not?

A Yes.

(Testimony of J. S. Burge.)

Q Was that all of the pavement that you removed from Blackstone Avenue?

A Let's see. I am wrong on that. There were four sections kept here—four quarters—of those two samples, and there were two sections sent to Boston. I think that is correct.

Q Where are the four pieces that you kept here?

A I have part of them in my possession.

Q Now, you don't know, then— You can't state that these pieces of Exhibit 17 are, as a matter of fact, a part of what you sent at all, can you?

A Not of my own knowledge; no sir.

Q Did you send these things direct from Fresno to Massachusetts?

A They were sent from Los Angeles.

Q Who sent them?

A I did.

Q How did you address them?

A They were addressed to P. H. Perkins in care of Warren Brothers Company.

Q From where did you send them?

A I sent them from a— Well, they went parcels post and were sent from a postoffice sub-station.

Q Bearing your name as the sender?

A I think they were in the name of E. S. Honberger as sender.

Q Now first referring back to Exhibit 16, you cannot tell, as a matter of fact, then, just where, from that Blackstone Avenue pavement, this piece was taken, can you, this particular piece (exhibiting)?

(Testimony of J. S. Burge.)

A, I cannot identify that particular piece; no sir.

Q Can you any of these other pieces that have been brought in here as exhibits of the Blackstone Avenue job?

A I have identified certain pieces from Blackstone Avenue.

Q Well, can you tell me, with reference to any of these exhibits, as to just where in the pavement they came from?

A I think so.

Q You don't know, of course, about Exhibit 17. Now, this piece, Exhibit 18, that is sawed into layers here, from just what part of Blackstone Avenue was that taken?

A I cannot identify that sample.

Q Can you identify that as being in fact, of your own knowledge, a piece of what you sent east?

A I cannot.

Q Now similarly with regard to Exhibit No. 19, the other exhibit that is in layers, you cannot identify that as a part of what you sent east, as a matter of your own knowledge, can you (exhibiting)?

A No, I cannot.

Q Now plaintiff's exhibit No. 20, this photograph, can you identify that positively as a part of what you sent east, of your own knowledge (handing photograph to witness)?

A No.

Q Now I show you this photograph, plaintiff's exhibit No. 22. Was that taken by you?

(Testimony of J. S. Burge.)

A Yes sir.

Q Just what does that show? Did you write that on the back?

A I did.

Q When?

A At the time that it was printed. I labeled these photographs.

Q Well, what does that particular one show?

A Showing the coarse layer—the layer of coarse material, rolled.

Q Before the mixture is spread on it?

A At the time it was being spread, because they are spreading it right there—see?

Q Then that binder was rolled out flat like it is in the picture and the workmen walked over it and spread the mixture on with a *rate*; is that correct?

A Yes sir.

Q Now the roller that rolled that, what size roller was it?

A It was what is known as a 10-ton roller.

Q Are you sure it is not sometimes called a 12-ton?

A Maybe. They might call it a 20; I don't know. It is what I know as a 10-ton roller.

Q That is as large a roller as is usually used in rolling a pavement, is it not?

A It is the ordinary type of roller used in rolling our pavement.

Q Now what is shown in this photograph Exhibit 23 (handing same to witness)?

(Testimony of J. S. Burge.)

A This shows the finishing course after being rolled, showing bright spots where stones in the binder course are just barely covered.

Q Just where was that picture taken? That is at that six-inch edge, is it not, that particular picture?

A Well, that lens there will take in the full width of the pavement, the 20-foot strip.

Q Now you say this was a common roller. This is the one, this picture in Exhibit 25, is it not (handing picture to witness)?

A I think so; yes. That is the roller they used.

Q Now you say that roller only passed over the binder course once along a 6-inch edge of the pavement. About how many times would it pass over any particular spot up in the middle or ordinary part of the pavement?

A It might pass over it eight or ten times.

Q It did, did it not?

A Possibly.

Q It did, did it not, on Type A construction, in the middle part of the pavement, pass over it eight or ten times?

A It possibly did; yes.

Q Now you say this was a common roller. How long have you known of such rollers being used?

A Oh, about 19 or 20 years; something like that.

Q What were they used for?

A They are the usual type of roller used in laying a stone mixture surface.

(Testimony of J. S. Burge.)

Q How long have you known about a binder course ever being laid for pavement, to your knowledge?

A Well, they used to lay a binder course under sheet asphalt pavements.

Q By sheet asphalt you mean a mixture of asphalt and finely divided mineral matter, don't you?

A Yes sir.

Q And that is laid on a sheet on top of a binder course, is it not?

A Yes, sir.

Q Was the binder course first rolled?

A It was.

Q By this same type of roller?

A No.

Q Was it not as heavy a roller as this?

A It was not.

Q It was not as heavy a roller?

A Not generally. I have known of cases where a ten-ton roller was used.

Q How far back do you know of your own knowledge?

A Oh, I don't know; 1898, I guess.

Q And then after they had rolled the binder course they spread on this mixture of asphalt and sand, which you call sheet asphalt, and then rolled that again on top of the binder course, did they not?

A Yes sir.

Q Now you have laid warrenite pavement, have you not, prior to 1910?

(Testimony of J. S. Burge.)

A I have inspected warrenite and bitulithic pavements.

Q When did you go to work for Warren Brothers?

A In 1902, I think I said.

Q What kind of pavement were they laying in 1902?

MR. EVARTS: I object to that. I don't see that it is cross-examination. If the court wishes to hear it, however, we have no objection to it.

MR. F. S. LYON: It shows how these three courses were laid. It is our defense that we are doing nothing here that had not been done before. This witness has already stated in regard to these rollers, and so forth, that they are old and well-known, and we expect to show by him how they were used. He says we used them on this particular pavement that is complained of in a certain manner. Certainly we have a right to show that there was nothing peculiar about what manner, that it was the usual, ordinary, old manner in which they had been used by the plaintiff and others for years, and that it was not an exceptional rolling or anything different from the ordinary. There is no subterfuge about it. It was a regular rolling of the course.

THE COURT: It seems to me that you are going far afield if that is what you want to bring out.

MR. L. S. LYON: Well, we will make it 1906, so that it will be a little closer.

A They were laying stone mixture that I was

(Testimony of J. S. Burge.)

telling you about, and by stone mixture I mean a stone mixture used as a surfacing.

Q Now they were laying a binder course, were they not, of graded aggregate?

A No, sir.

Q In 1906?

A They were laying a stone mixture as a surfacing for different bases. That is, that was the pavement, this wearing surface.

Q Didn't they make up a mixture of graded stone with bitumen and lay that down and roll it?

A Yes sir.

Q In 1906? They call that bitulithic?

A Yes sir.

Q And that was laid on a foundation?

A Yes sir.

Q What kind of a foundation?

A Whatever the specifications called for.

Q It might have been an hydraulic concrete foundation?

A It might have been.

Q Or an asphalt concrete foundation?

MR. EVARTS: We object to this as entirely incompetent, irrelevant and immaterial and not cross-examination.

THE COURT: It is not cross-examination. The objection is sustained.

Q BY MR. L. S. LYON: Now on that work didn't they use this same roller in this same manner?

MR. EVARTS: Same objection. It doesn't make

(Testimony of J. S. Burge.)

any difference whether they did or not that I can see; It is not cross-examination, and is entirely incompetent, irrelevant and immaterial.

THE COURT: The objection is sustained. It is not cross-examination.

MR. F. S. LYON: Note an exception.

Q BY MR. L. S. LYON: Now you have said that the binder course was laid hot. When, to your knowledge, for the first time, was the binder course being laid hot? You said that was the work done on Blackstone Avenue.

A Now what binder course are you talking about—the sheet asphalt construction or this Type A construction?

Q No, binder course consisting of a graded aggregate with a bituminous binder in it.

MR. EVARTS: You are referring to Blackstone Avenue?

MR. L. S. LYON: I am asking him when, to his knowledge, was the first time that kind of binder course was laid, and laid hot.

A If you mean binder course as applied to sheet asphalt it is one thing; if you mean binder course as I have designated it, as a stone mixture wearing surface, it is an entirely different mixture.

Q Now the difference between the two is that with the sheet asphalt on top of the binder course they place another layer of bitumen and finely-divided mineral matter which you call a sheet asphalt; isn't that right?

(Testimony of J. S. Burge.)

A A sheet asphalt wearing surface.

Q For a top finishing course; is that right?

A A sheet asphalt wearing surface.

Q And that was placed on top of a hot binder course, was it?

A Of a binder course that was laid hot. It was never laid while the binder course was hot; never.

Q It never was the custom, then, to lay a sheet asphalt dressing on top of the binder course while the binder course was hot?

A Never heard of it.

Q That is something that an ordinary person wouldn't think of doing unless they had these directions that are included in these Wallace specifications?

A There are certain reasons why a construction man would not do it; see?

Q Now this Exhibit No. 27, can you identify just where that came from (handing exhibit to witness)?

A That was taken from route 16, section A, Fresno County construction.

Q Is that Blackstone Avenue work?

A This is route 16, section A.

Q And that is a different work, is it?

A I think so; yes.

Q Don't you know?

A I think it is; yes, sir.

Q Were you there?

A I was there and helped to take that sample.

Q Well, is that from Blackstone Avenue?

(Testimony of J. S. Burge.)

A It is not.

Q Under whose permission did you take this sample?

A I made no arrangements personally for the taking of that sample.

Q Were any arrangements made?

A Mr. Brough made the arrangements.

Q Was anybody present when this was taken up?

A There were four in the party, I think.

Q In your party, four Warren Brothers' representatives?

A Yes.

Q Was anybody else there when it was taken?

A I think not.

Q Nobody else on the job at all?

A I think not.

Q And you just went out on the county highway and pulled up a piece; is that right?

A Yes sir.

Q Now just where on the highway did this particular piece come from—on the edge, or—

A No; I should say that was four feet out from the edge.

Q Can you remember distinctly this particular piece being taken up?

A That sample extended from the marginal curb about four feet toward the middle of the road.

Q And this is a piece out of that sample?

A Yes, sir.

Q Now how about this Exhibit 28: were you pres-

(Testimony of J. S. Burge.)

ent when it was taken up (handing exhibit to witness)

—I think it is No. 211.

A Yes. Yes; it is from the same—section A of route 16.

Q Same sample. Now Plaintiff's Exhibit No. 29 is also from that same specimen, is it not?

A Well, I don't know.

Q Just a minute. I will show it to you (handing exhibit to witness).

A Yes; this is from the same specimen.

Q Now Plaintiff's Exhibit 30, where did it come from (handing exhibit to witness)?

A This came from route 5, section A, Blackstone Avenue.

Q And when was this taken up—at the same time you took up the two pieces you have told us about before?

A It is a part of the two pieces.

Q You cannot tell which one or just exactly where on the road this came from?

A Oh, no. Oh, no.

Q And the same way with the rest of the exhibits, Nos. 32, 33, 34 and 35 (handing exhibits to witness)?

A These are parts of route 5, Section A.

Q That also includes exhibits Nos. 36, 37 and 38, does it not, that you have here?

A Yes; it covers all of these.

Q Now these Exhibits 27 to 38, these ones that are smooth here, are sawed, are they not,—have been sawed up too?

(Testimony of J. S. Burge.)

A Yes, sir.

Q Has it not been your experience that sawing through a piece of paper like that will cause the bitumen to run and somewhat change the appearance of it?

A It doesn't change the appearance of it.

Q Would it not look a little different if it was broken in two?

A It would look decidedly different.

Q Doesn't the heat of the saw and the friction of the saw, the movement of the saw, carry the particles from one place to another in the pavement to a certain extent?

A There is no saw used.

Q I thought you said you sawed it in two?

A I did.

Q How did you do it?

A With a wire.

Q Wouldn't a wire do the same thing?

A No, sir; because the wire is kept wet and cold, and it doesn't disturb the bitumen.

Q Do you mean to tell me you can cut through rocks of that sort with a wire?

A Yes, sir.

Q Without disturbing the rock?

A Yes, sir.

Q Or without disturbing the pavement?

A Yes, sir.

Q Did you do it?

(Testimony of J. S. Burge.)

A Yes, sir. It was done under my supervision, and some of it I actually did.

MR. L. S. LYON: That is all.

RE-DIRECT EXAMINATION,

BY MR. EVARTS:

Q Referring back to this Blackstone Avenue work laid by Thompson, that you saw, about how thick would be the binder course before it was rolled—the binder course now, not the top?

A That is, after spreading?

Q After spreading and before rolling.

A I think I *sand* an inch and three-quarters or two inches. Now it is about that.

Q Now after the second coat was put on and the rolling was completed how thick was this entire binding course?

A Approximately an inch and a quarter.

Q That was after both rollings?

A Final compression.

Q Now you spoke of laying this sheet asphalt. How thick would that be laid back here in years gone by when you were talking about?

MR. L. S. LYON: Now we object to going into that.

THE COURT: It wouldn't be cross-examination, and it is immaterial anyhow.

MR. EVARTS: Well, that is all for the present, Mr. Burdge.

(Testimony of Arthur F. Brough.)

ARTHUR F. BROUGH,

called as a witness on behalf of plaintiff, in rebuttal,
and being first duly sworn, testified as follows:

DIRECT EXAMINATION,

BY MR. EVARTS:

Q What is your name?

A Arthur F. Brough.

Q Where do you reside?

A In the city of Fresno.

Q What is your occupation?

A I am inspector for the Warren Brothers Company.

Q How long have you been in their employ?

A Between five and six years.

Q Are you familiar with the work that was done on Blackstone Avenue by Thompson Brothers that is the matter in suit here?

A Yes, sir.

Q And were you present during the greater portion of the laying of that pavement?

A Yes, sir.

Q When the binder course was brought out and laid on the street was it hot or cold?

A It was always hot.

Q And after it was laid on the street was it rolled?

A After it was laid and raked it was rolled; yes.

Q And was it this roller that you have seen the picture of?

A Yes, sir.

(Testimony of Arthur F. Brough.)

Q Now describe how that was rolled.

A They started at either the lower or the upper edge and worked across the width of the pavement, lapping the wheels from six to twelve inches.

Q And how many times would they go from one side to the other in that way?

A In most instances only once, and in a few rare cases they went over it twice.

Q After they went over it with the roller in this manner, how long after they had completed the rolling of that binder course before they put on the top course?

A Oh, two or three minutes.

Q And what was the condition of the temperature of the binder course at the time it was put on—at the time the top course was put on?

A The binder course would range between two and three hundred degrees Fahrenheit.

Q And what was the temperature of the top course at the time it was put on?

A Between 200 and 350 degrees.

Q And what was the extent of rolling that was done after the top course was put on?

A Oh, it received probably from four to six or eight times—maybe more—rolling, than the binder course.

Q And after the binder course was rolled and before the top course was put on at all what was the condition of the surface? Describe it.

A The contour of the street was more regular than

(Testimony of Arthur F. Brough.)

before the rolling, but there were surface voids and spaces between the stones.

Q And would there be any marks left of the wheels of the roller after the binder course was rolled?

A Yes sir.

Q After the top course was put on and rolled what was the condition of the surface of that street then?

A After the top course was put on and rolled—

Q And the rolling completed.

A And the rolling completed, it was perfectly cool. It was rolled until it was unyielding both with a 12-ton and an 8-ton roller.

Q Now you were present when Brough took up some samples here of the Blackstone work?

A Yes sir.

Q A great deal has been said about permission. What, if anything, did you do with reference to securing permission?

A Before we cut any samples on this route or any of the others I always asked permission from the chief inspector of Fresno County, Mr. Leyden, and also the contractors.

Q And Mr. Leyden was always pleased to give you every opportunity you wanted, was he not?

A Yes, sir; he told me to take anything I wanted.

Q Now did you take up some specimens of what we call Type B pavement—on the laying of that pavement—any place?

A Yes, sir.

(Testimony of Arthur F. Brough.)

Q Where did you take it up from?

A I took up several; some from the Fresno County highways and some from Kingsbury City, California.

Q What did you do with those samples?

A I brought them to Los Angeles in my machine.

Q To whom did you turn them over?

A I delivered them to Mr. Burdge.

Q The gentleman who was just on the stand?

A Yes, sir.

Q Did you see any work done on the Clovis Type A district out there?

A Yes sir.

Q Were you ever there at any time when there was a sample being left or a part being left without putting on any top coat on it?

A Yes sir.

Q Will you tell the court just exactly what that was?

A Well, at the time I arrived on the street there was a small area—

Q This was out by Clovis?

A This was out by Clovis, on route 8. At the time I arrived on the street there was a small area of the binder course—

Q About how big an area?

A About a foot and a half wide and two and a half feet long, at the edge of the pavement, that was left uncovered, that is, that didn't have the fine mixture spread on it, and the binder course in that case received the initial rolling that the balance of

(Testimony of Arthur F. Brough.)

the binder course did; also received the rolling that was given to the surface of that work?

Q And was anyone there in charge of that work?

A There was a superintendent in charge for the Federal Construction Company, and there was also a man by the name of Anderson who was employed by Mr. Jensen—

Q Mr. Anderson was assistant to Mr. Liddell, the good-looking gentleman over there, was he?

A He was an assistant to Mr. Jensen; yes.

Q And he was employed by the County and had charge of the work at that time?

A No; Mr. Anderson didn't have charge of the work, but was sent out to secure the samples, as I understood from Anderson himself. I asked him what he was leaving this small area uncovered for, and he said it was to secure a sample for Mr. Jensen from that pavement when it cooled the following morning.

Q Now that piece or sample that was brought in here—did you see that get the initial rolling as well as the final rolling?

A Yes, sir.

Q I show you Exhibit I filed in connection with the affidavit of Chris P. Jensen, and ask you—

MR. EVARTS: It is, I suppose, if your Honor please, as a matter of explanation that this is filed as a sample of the binder course after compression.

Q I will ask you if that is, in your judgment, a fair sample of the ordinary binder course as it showed

(Testimony of Arthur F. Brough.)

on the Blackstone job after the rolling you have described?

MR. L. S. LYON: We object to that as merely a matter of opinion as to whether or not it is a fair sample. They have had five months in which to present all the affidavits and opinions they wanted to about that specimen. It has been here all that time.

THE COURT: Objection overruled.

A This is not a fair sample of the way the binder course on Blackstone Avenue appears.

Q BY MR. EVARTS: I will ask you whether or not that resembles the stuff that you saw out in the Clovis district there that had received the initial rolling and also the final rolling.

A Yes, sir.

MR. F. S. LYON: That is objected to as leading and suggestive and not rebuttal, and as barred by the order of this court under Rule 48.

THE COURT: Overruled.

MR. F. S. LYON: Exception.

Q BY MR. EVARTS: I show you a picture and ask you if that was taken by you.

A It was.

Q Where?

A Type A construction on Blackstone Avenue.

Q What was the condition of the work at the time that picture was taken?

A The binder course had been rolled, and they were spreading the fine mixture.

(Testimony of Arthur F. Brough.)

MR. EVARTS: We offer it in evidence as Plaintiff's Exhibit No. 36.

Q I show you another picture and ask you if you took that picture.

A Yes sir.

Q Whereabouts?

A That is part of Type A construction on Blackstone Avenue.

Q And what does it show?

A It shows, in the immediate foreground, some of the binder course that has been rolled and the men spreading the fine mixture over it.

Q Where is the binder course?

A Here is the binder course here (indicating).

MR. EVARTS: We offer it in evidence as Plaintiff's Exhibit No. 37.

Q I show you another picture. Did you take that?

A Yes, sir.

Q Whereabouts?

A On Blackstone Avenue. Part of the Type A construction.

Q And what does it show as to what was being done?

A It shows the spreading of the fine mixture on the binder course after the binder course has been rolled.

MR. EVARTS: We will offer it in evidence as Plaintiff's Exhibit No. 38.

Q I show you another picture. Did you take it?

A Yes, sir.

(Testimony of Arthur F. Brough.)

Q Whereabouts?

A It is part of Blackstone Avenue Type A construction.

Q What does it show?

A It shows the oil-spots on the pavement which indicate the presence of the rock close to the surface, not right at the surface.

Q Has this been rolled?

A That is part of the finished construction.

MR. EVARTS: We offer it in evidence as Plaintiff's Exhibit No. 39.

Q I show you another picture. Did you take it?

A Yes, sir.

Q Whereabouts?

A On Blackstone Avenue; Type A construction.

Q This work in question?

A Yes, sir.

Q And what does it show as to the condition of the work at that time?

A It shows the finishing course after rolling.

MR. EVARTS: We offer it in evidence as Plaintiff's Exhibit No. 40.

Q I show you another picture. Did you take it?

A Yes, sir.

Q Whereabouts?

A Blackstone Avenue, Type A construction.

Q In this suit in question?

A Yes, sir.

Q And what was the condition of the pavement there at the time you took it?

(Testimony of J. S. Burge.)

A It shows some of the binder course before compression and after compression, and the roller working on the finished pavement.

Q Now looking at the picture, what is this on the right-hand corner?

A That is the binder before compression.

Q On the left-hand corner what is it?

A That is the binder after it had the initial compression.

MR. EVARTS: We offer it in evidence as Plaintiff's Exhibit No. 41. Take the witness.

MR. L. S. LYON: No cross-examination.

MR. EVARTS: I will ask Mr. Burdge to take the stand again.

— — — —

J. F. BURDGE,

Recalled in rebuttal, testified as follows:

DIRECT EXAMINATION,

BY MR. EVARTS:

Q It has been testified to by Mr. Brough that he delivered to you some samples of pavement. Is that true?

A Yes, sir.

Q And which were marked as being taken by him from certain portions of Type B pavement.

A Yes, sir.

Q I am showing you one that bears the mark No. —

A 363.

(Testimony of Albert F. Brough.)

Q And he had these marked as to where they came from at the time he delivered them to you?

A Yes, sir.

Q And you have had them in your possession ever since?

A Yes, sir.

Q Now where did this come from?

MR. L. S. LYON: We object to that as hearsay. He brings in some samples and says the man brought them in, as to where they came from. Now counsel asked him where they came from.

THE COURT: The objection is sustained. He doesn't know where they came from.

MR. EVARTS: Well, may I have the privilege of calling Mr. Brough here a moment again to make this chain complete?

THE COURT: Yes.

MR. EVARTS: May I ask him right where he is?

THE COURT: Yes.

ALBERT F. BROUGH,

recalled by plaintiff in rebuttal, testified as follows:

DIRECT EXAMINATION,

BY MR. EVARTS:

Q The specimens you took from Type B pavement that you testified you delivered to Mr. Burdge, were they marked at the time as to where they came from?

A Yes, sir.

Q And you delivered them to him in that condition?

(Testimony of J. S. Burge.)

A Yes, sir.

Q They came, as a matter of fact, from the places that you marked them; that is, you marked them correctly as to where they came from?

A Yes, sir.

J. D. BURDGE,

Recalled by plaintiff in rebuttal, testified as follows:

RE-DIRECT EXAMINATION resumed,

BY MR. EVARTS:

Q I show you a sample here that is marked "363."

A "363."

Q What is that?

MR. F. S. LYON: That is objected to as incompetent and hearsay. The witness has no knowledge as to what they are. He knows what is on them, and that is all he does know.

THE COURT: Well, they speak for themselves as to what is on them. He cannot tell us anything about that.

Q BY MR. EVARTS: Well, is this a portion of the pieces that you received from Mr. Brough as marked by him, taken from Type B pavement in Fresno County?

MR. F. S. LYON: We object to that as leading and suggestive.

THE COURT: Is this one of the pieces you got from this other man?

MR. EVARTS: Yes, which were marked that way.

THE COURT: Well, never mind how they were marked. Is this one of the pieces you got?

(Testimony of George C. Warren.)

THE WITNESS: Yes.

THE COURT: And you have done nothing with them since except to keep them?

THE WITNESS: No; we have had them in our possession.

THE COURT: All right.

MR. EVARTS: Then I will introduce these respective pieces in evidence.

(Samples filed as Plaintiff's Exhibits 42-48, inclusive.)

MR. EVARTS: That is all.

— — — —

GEORGE C. WARREN,

recalled by Plaintiff in rebuttal, testified as follows:

DIRECT EXAMINATION,

BY MR. HEAD:

Q What was your official connection with Warren Brothers Company in 1902?

A I was general manager.

Q Was any pavement laid in the City of New Bedford, Massachusetts, during the year 1902, under the patents of Warren Brothers Company?

MR. L. S. LYON: We object to that as not rebuttal, and as incompetent, irrelevant and immaterial, and a violation of the ruling of the court made under Rule 48 as to expert testimony.

THE COURT: What is the purpose of it?

MR. HEAD: Just to show the practice that they had followed. The allegation has been made that

(Testimony of George C. Warren.)

they were simply adopting the practice of the Warren patent under their C wearing surface.

THE COURT: Who made that allegation?

MR. HEAD: Mr. Lyon.

THE COURT: When?

MR. HEAD: In his talk to the court yesterday.

MR. L. S. LYON: I don't think you understood me correctly, Mr. Head.

THE COURT: Well, we cannot decide this case on talk by counsel. We must decide it on the facts. What is there in the facts to which this is relevant—the facts produced here in evidence?

MR. HEAD: The fact that I am offering in evidence?

THE COURT: What is there in the facts now in evidence to which this is relevant?

MR. HEAD: The fact now in evidence is the allegation that they are operating under expired patents. I am trying to prove by this witness that the work they did in 1902, according to the patent in force, was according to what they say they are doing now, that it proved unsatisfactory, was relaid the next year, and that it was not until the patent in suit was invented that they had found a means of satisfactorily overcoming the difficulties which occurred under the previous patents. That is the purpose of this examination.

THE COURT: I do not see the materiality of it.

MR. HEAD: Well, we desire to offer that, as to the procedure under the patents then in force, that

(Testimony of George C. Warren.)

have now expired, to show that it was a different procedure from that under the Wallace patent.

THE COURT: I cannot see how the procedure under the Wallace patent is at all involved here. The question is whether or not they are infringing the Wallace patent by the specifications and work done in Fresno County.

MR. HEAD: And they are saying that what they did is under the expired patents.

THE COURT: What difference does it make as to what they say as to what they did? It is a fact as to what they did and not what authority they thought they had to do it under. The question is what did they do, and whether the thing they did infringed your patent. Now that is the proposition here. How does that involve what you did in 1902?

MR. HEAD: I am trying to tell you what we did under the patents then in force, and which they say they are doing now.

THE COURT: Well, how is it material?

MR. HEAD: Then if they are acting under the patent that has expired they are not infringing the present patent. I am trying to show that what they did under the patent existing in 1902 was unsatisfactory and did not accomplish the results and that it was not until under the patent of 1910, issued to Wallace, they they were able to do it. I am trying to show the difference between the two.

THE COURT: I don't see how it is material, but I will let you show it.

(Testimony of George C. Warren.)

MR. F. S. LYON: Exception.

Q BY MR. HEAD: Please state what was done in the laying of pavement in New Bedford in 1902 under the Warren patent—the patents that were issued then to Warren and have been cited in anticipation of what was done in this case.

THE COURT: Been cited or introduced in evidence?

MR. HEAD: Been introduced in evidence. I beg your Honor's pardon.

THE COURT: All right.

MR. F. S. LYON: And will our objection and the ruling and exception extend to all of the examination of this witness?

THE COURT: No, I will do nothing of the sort.

A The one to which you refer was in 1901 and not in 1902; and it was one of the first pieces of pavement which had been laid under our then existing and pending patents which have been referred to or cited or offered in evidence in this case. That patent stated that there may be laid over the wearing surface a mixture of sand or gravel or fine crushed stone, or that there may be spread over it a layer of bitumen and stone screenings rolled into it. Realizing the advantage of that thin surface mixture, we endeavored, in a pavement we laid that year, which was a demonstration section of one block, to lay such a mixture in accordance with the practice at that time in connection with the laying of the binder course by thoroughly compressing the lower course first and then,

(Testimony of George C. Warren.)

when that was thoroughly compressed and chilled, of spreading the fine mixture surface over it. The result was that there was no blending, no bonding between the two courses, and the thin upper surfacing pushed, scaled, and the following year we had to entirely relay the pavement because of that defect; and from then on we followed the plan of painting the surface and rolling sand or screenings into it—what is commonly known as flush-coating it.

Q In what respect was that construction changed after the Wallace patent was issued?

MR. F. S. LYON: The same objection.

THE COURT: The same ruling.

MR. F. S. LYON: Exception.

A After we had heard of Mr. Wallace's construction and had demonstrated it for two years, as referred to in my testimony yesterday, we undertook to adopt that for our general construction, the plan of construction being to spread the coarse mixture and over that spread the fine mixture and roll the two together; except that in a few cases we lightly rolled the lower course and spread the finer course after that initial rolling; but we believed, and still believe, that the spreading of the two courses without the initial compression is the better process, with safer results.

Q BY MR. HEAD: And that process has been generally followed wherever it could be introduced until the present day?

MR. F. S. LYON: Same objection.

(Testimony of George C. Warren.)

THE COURT: Same ruling.

MR. F. S. LYON: Exception.

A Yes sir.

MR. HEAD: Take the witness.

CROSS EXAMINATION

BY MR. L. S. LYON:

Q Now you say you adopted it for your general construction. Does your company lay pavement, the plaintiff in this case?

A Oh, yes; about two million yards a year.

Q You lay it?

A Oh, yes.

Q Don't you have it laid through some contractor?

A Sometimes.

Q Has your company laid any pavement in the State of California?

A I don't know that we have in the State of California. We have in many other states.

Q Why, then, after you found that the Wallace method, as you term it, was better than your Warren method, did you continue to lay under the Warren method up until a couple of years ago?

A It was not always a matter of our choice. We had a great deal of difficulty in a great many places in satisfying the officials that it was a superior construction, and it was a gradual development under the improvement, and it took a number of years before the public generally realized that it was an improvement.

(Testimony of George C. Warren.)

Q But since your Warren patent on the binder ran out you have specialized on the Wallace patent, have you not?

A No more since than we did before.

Q Well, is it not a fact that in 1921 eighty-two per cent of your construction is by the Wallace method, whereas in 1919 only forty per cent was?

A Surely. Not because of any increased effort, but because of an increased recognition of the improvement by the public.

Q Then how do you reconcile your statement that you are not now and since the Warren patent ran out laying more of the Wallace method than you are of the other?

A If I said that I misunderstood your question. What I intended to say was that since the expiration of the earlier patents we have made no more effort to secure *then* adoption of the construction under the Wallace patent than we made for several years prior.

Q Now that block that you laid in New Bedford in 1901 that you refer to, how was the binder course made in that block?

A It was not called binder course; it was termed a dense asphaltic mixture of varying sizes of crushed stone.

Q Why did you call it dense?

A Because it was as dense as we could make with those ingredients.

Q Then it didn't have the graded ingredients that you patented in your patent No. 727,505?

(Testimony of George C. Warren.)

A It was laid in accordance with patent No. 727,505; one of the earlier constructions in accordance with that patent.

Q Well, did it have those same grades in it?

A Yes, sir.

Q As are in patent No. 727,505?

A Yes, sir.

Q And it had bitumen in it?

A Yes, sir.

Q Then it had less than 21 per cent voids in it?

A Yes, sir.

Q What did you mean by your statement, then, that it was not as dense as your later method?

A I don't think I made such a statement.

Q What did you say, do you remember, just a few minutes ago on that point?

A I would ask the clerk to read what I said.

Q Well, can you remember what you said a few minutes ago in response to this same question about the construction of the binder course in that New Bedford block? Just repeat as nearly as you can your testimony on what you said about that.

A I said that that was construction made of varying sizes of stone and asphalt.

Q Is that all you said?

A I think that is what I said in response to that question.

Q Well, is that all you can remember that you said about that?

A In response to that question, as I recollect.

(Testimony of George C. Warren.)

Q Repeat anything else you remember saying about the binder course in that block in 1901.

MR. EVARTS: Binder course?

MR. L. S. LYON: The binder course or its equivalent.

MR. EVARTS: There was no binder course.

A There was no binder course.

Q BY MR. L. S. LYON: Well, repeat just what you said about that same thing.

MR. EVARTS: That is objected to as incompetent, irrelevant and immaterial and not cross-examination.

THE COURT: The objection is overruled.

A You have asked me a number of questions, and if you will put your question as you did to me again, I will try and answer you the same way.

Q You remember, do you not, referring to a block of pavement laid in 1901, in your previous examination?

A Yes, sir.

Q And you remember referring to the construction of what we term the binder course, and you said it was not named the binder course, but you went ahead and described it. Do you remember that?

A Yes.

Q Now go ahead and tell us just what you said about that same particular thing.

A I said, as I recollect it, that it was made of varying sizes of aggregate crushed stone and sand and asphalt cement, made as dense as it could be

(Testimony of George C. Warren.)

made—as solid. Substantially, that is what I said. Maybe it is not the exact words.

Q About how thick was this finishing course put on?

A About a quarter of an inch; possibly half an inch; I am not certain.

Q And that was put on after this course that I call the binder course, and I don't know what you call it. You say you didn't refer to it as a binder course. Anyhow, that course was rolled before you put this finishing course on?

A Yes, sir.

Q Now what was that finishing course made of?

A I can't say whether it was made of fine crushed screenings or sand or a mixture of the two, but it was equivalent to coarse sand.

Q Together with bitumen?

A Yes, sir.

Q That was mixed before it was laid on the road, was it?

A Yes, sir.

Q And then raked and rolled?

A Yes, sir.

Q How thick was the binder course underneath that quarter or half-inch layer?

A It was laid to specification of two inches or probably somewhat more than that. It was laid on a broken-stone base and some of the surface would compress into the stone.

Q How long was that block down there?

(Testimony of George C. Warren.)

A It was relaid the next year.

Q It was there for a year, was it?

A Yes, sir.

Q Used with traffic over it for over a year?

A Yes.

Q What street in New Bedford was that on?

A Oh, I don't remember the name of the street.

Q On a business street?

A Yes, sir.

Q One of the prominent streets in the town?

A Combination business and residence.

Q Now what size roller was used in rolling the course on which the top mixture was placed prior to the time the top mixture was laid and raked?

A It was either a ten or twelve-ton roller. I can't say which. We were using both at that time.

Q Now that pavement, you say, was covered by patent No. 727,505?

A It was.

MR. L. S. LYON: That is all.

Q BY MR. HEAD: You said this work was done under patent 727,505. I will ask you if it was not done at the time your application for that patent was pending.

A Yes; but it was in accordance with that subsequently issued.

Q And the patent was not issued until later?

A No, sir.

MR. HEAD: That is all.

MR. L. S. LYON: That is all.

(Testimony of George C. Warren.)

MR. EVARTS: We would now like to offer, if your Honor please,—it was offered yesterday, and the court said he would read it anyway if he cared to—Richardson's book. The offer was made on the 1905 edition, was it not?

MR. L. S. LYON: I think that is the one we offered in evidence.

MR. EVARTS: Well, we would like to offer in connection with it the edition of 1908. The only difference is that it has some little different phraseology, but the descriptions of some of the work you have called attention to are in this edition shown by maps or cuts.

MR. L. S. LYON: I don't think this second book is material, your Honor. We rely on the 1905 edition as a printed publication of what is stated therein. This book now comes out not more than two years prior to Wallace's application, and I don't see what difference it makes.

MR. EVARTS: They have certain descriptions there that they have relied on, your Honor. Now those same descriptions are shown in this book, but, in addition thereto, there are shown plates which these descriptions refer to. That is the main reason for introducing it.

MR. L. S. LYON: We cannot add anything to or subtract anything from the sufficiency of the 1905 publication as a publication, and it will be incompetent for any purpose.

THE COURT: The objection is overruled.

(Testimony of Arthur F. Brough.)

MR. F. S. LYON: Exception.

(Book filed as Plaintiff's Exhibit No. 49.)

MR. EVARTS: Plaintiff rests.

THE COURT: One of these witnesses here referred to a specimen produced by Mr. Jensen and said it was not a fair specimen. Who is that?

MR. EVARTS: That was Mr. Brough.

THE COURT: Please come forward, Mr. Brough. I want to ask you about that.

— —

ARTHUR F. BROUGH,

recalled by the court, testified as follows:

Q BY THE COURT: Are you the one who said this was not a fair specimen?

A Yes.

Q Why?

A Because it received more rollings than the binder course on Blackstone Avenue.

Q How do you know it did?

A I saw it.

Q Where was this specimen taken from?

A From another route and section of the Fresno County highway.

Q How do you know it was?

A I saw the piece they left exposed, and the man that had located the sample told me he was returning next day to remove the same for Mr. Jensen for exhibit at this trial. I couldn't swear that came exactly out of that piece, but if they didn't get more

(Testimony of Arthur F. Brough.)

than one sample it probable came out of that same sample.

Q Probably?

A He refers in his affidavit that it came from that route and section number.

Q What route and section number?

A 8, near Clovis.

Q Why is it an unfair sample of what was done on the binder course?

A On the Blackstone Avenue work?

Q Yes.

A It received probably five or six times more rolling than the binder course on Blackstone Avenue, and maybe more.

THE COURT: That is all.

CROSS EXAMINATION

BY MR. L. S. LYON:

Q Now you cannot say of your own knowledge, and positively that this Exhibit I did come from this spot that you saw on this Clovis section, can you?

A I don't know which is Exhibit I.

Q Exhibit I is this one you have referred to as being, in your opinion, an unfair specimen (exhibiting).

A I can't say by looking at it that it came from that particular spot, no.

Q You didn't see this specimen taken up, did you?

A I did not.

Q You didn't see any specimen taken up, did you?

A I did not.

(Testimony of Arthur F. Brough.)

Q You never saw this specimen before you saw it in this box, did you?

A No.

Q Now at this Clovis place had the finishing mixture been put on the pavement when you saw it?

A Surrounding an area that they had left uncovered with the binder.

Q Was there a hole in the pavement? Had a piece of binder been taken up when you saw it?

A No, it was left exposed and was receiving compression.

Q Who was the man that told you this?

A Told me what?

Q Told you this statement about this piece that was left unfinished on this Clovis job?

A I saw the piece left unfinished.

Q Well, who told you about it? You had a conversation with a man and he said something about going out and getting the sample.

A Mr. Anderson I think the man was. I can refer to my notes.

Q All right, refer to your notes and find out who it was.

A (Referring to notes) Mr. Anderson was the gentleman's name.

Q Anderson. Did you get his first name?

A I did not.

Q What was his position?

A He was a surveyor employed by Mr. Jensen—an engineer.

(Testimony of Arthur F. Brough.)

MR. L. S. LYON: We move to strike out the testimony of the witness on the ground that it is incompetent and hearsay. He says he didn't see the sample taken up, he doesn't know whether this sample came from that place, and yet he says he doesn't think it is a fair sample because it had more rolling—that it got rolling along with the top course.

THE COURT: Strike what from the evidence?

MR. L. S. LYON: His testimony with regard to this sample.

THE COURT: On what ground?

MR. L. S. LYON: It is not supported by anything at all except hearsay evidence.

THE COURT: Well, what testimony with respect to the sample?

MR. L. S. LYON: The testimony of this witness in regard to this Exhibit I, in which he says that he does not consider it a fair sample because somebody told him that—

THE COURT: That testimony came in a long time ago and you never said a word about it. Now that is past. The motion is denied.

MR. L. S. LYON: This is the first time, your Honor, that we have had opportunity to cross-examine him to find out what his knowledge was. It was the other man that we cross-examined. We haven't cross-examined this man yet; we have just started.

MR. EVARTS: No; you waived your cross-examination in the court room.

(Testimony of H. E. Leyden.)

THE COURT: You said that you had no questions to ask him.

MR. EVARTS: Yes; and the court called him back; you didn't call him back now.

MR. F. S. LYON: Note an exception.

MR. EVARTS: Plaintiff rests.

SUR-REBUTTAL.

H. E. LEYDEN,

a witness called in behalf of the defendants, in sur-rebuttal, being first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. L. S. LYON:

Q Please state your name.

A H. E. Leyden.

Q You are the Harry E. Leyden who made an affidavit in this case heretofore?

A I am.

Q And are the chief inspector of the Fresno County highway system?

A I am.

Q Now what have you to say about the amount of compression that was given to the Blackstone Avenue type A job prior to the time that the finishing course was put on?

MR. EVARTS: We object to this as entirely incompetent, irrelevant and immaterial and not rebuttal of anything brought out by us. This matter was gone into by this witness in his affidavit.

(Testimony of H. E. Leyden.)

THE COURT: The objection is overruled.

A We gave the Blackstone pavement the regular rolling of half lapping the back wheel all the time, working over—it was half a street; we worked from the edge of the gutter towards the high point and tried, as nearly as we could, to half lap the wheel—the real wheel. I think it was a twenty-inch wheel. Possibly Mr. Burdge described it about as good as anybody could, as far as that is concerned.

Q What have you to say about some piece being left unrolled—some piece of the binder course—on that Blackstone Avenue job?

A Well, we were kind of unfortunate in the sub-grade out there, in fact we had to take up quite a lot of it, and when we came to put the pavement—we had the base down and it looked fairly good, but when we came to put the top on it we found it was creeping, that is, cracking up, and I think we excavated for about a depth of two feet and put material in there. I won't say two feet, but quite a depth that we had to excavate to get down to a good sub-grade that would hold up.

Q And is that the only piece on the binder course that you failed to roll until after the finishing course was put on, on the Blackstone Avenue job?

A I really don't know of any other.

Q There was no other to your best knowledge?

A No, not while I was around, and I don't think there was anything—because I had what I thought

(Testimony of H. E. Leyden.)

was a competent inspector there and he had his orders as to what do to.

Q And you were there off and on yourself?

A I was there off and on; yes.

Q Now that one piece that was not rolled, then, was removed, was it, as defective?

A Oh, yes, it was defective.

Q And was removed?

A Yes.

Q Now you have made recently, in the Type A construction, a chalk experiment, have you not, to show whether or not there is any blending of the top and bottom courses—I mean by that the finishing course and the binder course—when the Type A specifications were followed?

A Yes.

Q Now this sample that I have was a sample of that experiment, was it not (exhibiting same)?

A That is the same.

Q All right; now tell us what you know about this sample

A This is the sample that was laid on May 31, 1921, and was taken out on November 6, 1921.

Q Where?

A On Clovis Avenue, Route 8, Section A.

Q And this shows, does it not, the way this sample was made?

MR. EVARTS: That is objected to as leading.

MR. L. S. LYON: All right.

Q How was the sample prepared?

(Testimony of H. E. Leyden.)

A The sample was prepared—we left a hole—this French chalk we found out has no affinity for asphalt, so we couldn't spread it over right as we went along, so we left a place I think about two feet square, possibly a little bit more, there and put the seal coat on and rolled it over and then came back and spread the French chalk on and filled up the space with the asphalt, and that is the way the sample was made.

Q And that was during the regular construction of the Type A?

A That was during the regular construction of the Type A there, yes.

Q Then what does this chalk mark demonstrate, in your opinion, Mr. Leyden?

Mr. Evarts: That is objected to as incompetent, irrelevant and immaterial. The court can see for itself what it does.

THE COURT: Well, maybe I can't see far enough. I don't know. The objection is overruled. What is it? Let's see it.

(Sample shown to court.)

MR. L. S. LYON: Read the question.

(Last question read.)

A My purpose was to prove that the sheet asphalt did not penetrate and go down into the binder course.

Q BY MR. L. S. LYON: What does it show in that regard, then?

A It shows, in that regard, that there is a thin layer of sheet asphalt on top of the binder course.

Q And that they are separated, are they?

(Testimony of H. E. Leyden.)

MR. EVARTS: That is objected to as leading and suggestive, and it is a matter for the court to have something to say about.

Q BY MR. L. S. LYON: Well, in that sample are the binder course and the mixture course mixed or not—blended or not?

MR. EVARTS: That is objected to as incompetent, irrelevant and immaterial and calling for a conclusion and opinion of the witness.

THE COURT: Yes, you can see for yourself what it is. It shows the line of cleavage between the binder course and the finishing course, All right.

Q BY MR. L. S. LYON: Now is that line of cleavage maintained in Type A construction, from your observation of it as chief inspector of Fresno County?

A As close as we could. We do the same on the whole road. Our men have orders to put so much of that material on top to form a sheet of asphalt after the binder course has been rolled, and as far as the general inspection of it at the time I give it, that is about the result.

Q Now what have you to say regarding whether or not Exhibit I is a fair specimen of the binder course as it appeared after rolling on the Blackstone Avenue job prior to the time that the finishing course was spread on?

A Well, here are the two commodities right in the same samples. You can compare this one that way, and I think that would be a better sample than this.

(Testimony of H. E. Leyden.)

Q But what have you to say as to this being—

A Well, I don't consider this sample so good. This is our exhibit. I think that our binder there in that sample there is better compressed than that sample (indicating).

Q Was the Blackstone job, in your opinion, compressed as much as this Exhibit I?

A Yes, I should think it was.

Q I mean by that prior to the time the finishing mixture was put on.

A Yes; I don't think we favored that rolling any from Blackstone, or Blackstone any from that. We tried to lap the rear wheel in both cases, and I think we followed it.

Q Now what can you say as to whether or not this Exhibit I has received not only the compression ordinarily given to the binder course prior to mixing and spreading the mixture, but also the compression given to the finishing mixture after it is put on (handing sample to witness)?

MR. EVARTS: The finishing mixture is not on there, Mr. Lyon. We object to that as entirely incompetent, irrelevant and immaterial and unintelligible.

THE COURT: The objection is overruled.

A Do you mean to ask me whether I think that by putting the finishing course on that that will compress more?

Q BY MR. L. S. LYON: Yes.

A I don't think it can compress hardly any more. If it was warm it might move around to different

(Testimony of H. E. Leyden.)

places, or a little bit, but I don't think it would compress any more.

Q Then from your observation you can say that the binder course in Type A has been compressed, to all practical purposes, the same amount before the finishing mixture is put on as it has after the finishing mixture is thoroughly rolled and completed?

MR. EVARTS: That is objected to as leading and suggestive and not proper testimony at this time in any event.

THE COURT: Now wait a minute. I have let you wander all over the face of the earth in putting in your rebuttal, and now we are going to apply the same rule. The objection is overruled.

MR. EVARTS: It is leading and suggestive.

THE COURT: The objection is overruled.

(Last question read.)

A Well, as long as the pavement is hot it will have a movement. Now how much it will compress down after that I am not prepared to say, but it would be infinitesimal.

MR. L. S. LYON: This chalk specimen that the witness has identified is offered in evidence as Defendant's Exhibit N.

MR. EVARTS: It is objected to as entirely incompetent, irrelevant and immaterial, no proper foundation having been laid, and as not responsive to any of the issues in the case.

THE COURT: The objection is overruled.

(Chalk specimen filed as Defendant's Exhibit N.)

(Testimony of H. E. Leyden.)

Q BY MR. L. S. LYON: To your knowledge did Mr. Anderson have anything whatever to do with removing from the Clovis Avenue job this specimen Exhibit I?

A Mr. Brough has me kind of cornered there, because we had an engineer in our office there by the name of Anderson, but I think before that sample was taken out that man severed his relation. I suppose he means Mr. Childs.

Q Was it Childs that brought the sample up?

A Mr. Childs and Mr. Riggs were supposed to bring those samples up. Riggs was the regular inspector for the road; Childs is the engineer.

MR. L. S. LYON: The position we are in, if your Honor please, is that we relied upon the ruling of the court on these matters of opinion as to these exhibits, and we filed this exhibit away last spring, and it was only late this afternoon that anyone came in and gave an opinion that it was not a fair sample. Now we will have to bring down the man from Fresno that actually pulled it out of the ground. We didn't have him here because we supposed, in accordance with the ruling of the court, that the testimony was in on that matter; but it was done under the supervision and direction of Mr. Jensen and Mr. Leyden, and I suppose they can testify as to whether it appears to them to be fair or not.

MR. F. S. LYON: Are we going ahead with this case tomorrow, your Honor?

THE COURT: No.

(Testimony of H. E. Leyden.)

MR. F. S. LYON: The reason I ask that is that we might get those men down here tomorrow morning.

THE COURT: No; we must conclude tonight.

Q BY MR. F. S. LYON: Now what instructions did you give to these two gentlemen in regard to getting and preparing this specimen, Mr. Leyden?

A No more than to get a binder specimen. That is all.

Q Didn't you tell them that you wanted it without the finishing course on, or anything like that?

A Oh, yes. Well, that would be a binder specimen, without the finishing course on.

Q And in your opinion it is a fair specimen of the binder course as you observed it before it had received any rolling or any mixture before the finishing course?

A I think so; yes.

MR. L. S. LYON: You may inquire.

CROSS-EXAMINATION

BY MR. EVARTS:

Q Mr. Leyden, as to these specimens that have been introduced here, as a matter of fact, then, you didn't take them out yourself at all?

A The specimen from Blackstone Avenue I did.

Q You took out the one on Blackstone Avenue?

A I took out the one on Blackstone Avenue; yes.

Q But not any of the rest of them?

A Well, now, there are two specimens, I think, that I helped to take out.

(Testimony of H. E. Leyden.)

Q This one on Clovis that we have been talking about you knew—

A I ordered it out.

Q You ordered it out and someone brought it in?

A Yes.

Q After rolling the binder course and before putting on the top course you say you put on what?

A A sprinkling of French chalk; talcum-powder.

Q And how much of a sprinkling did you put on?

A Oh, no more than—

Q Well, half-inch, or an inch, or two inches?

A Oh, no; just a thin skin, usually.

Q And this is a piece of pavement from where?

A Station 30 plus 70 on route 8, Section A, on the Clovis.

MR. EVARTS: This is Exhibit N.

Q Did you see the amount of rolling that this binder course received before you put on the chalk?

A No, I did not, Mr. Evarts.

Q Well, was it done in your presence?

A It was laid—the material was just taken out of stock material. No more than—

Q I know. Except that on top of this binder course there was this layer of chalk. Did you put it on there yourself?

A No; I told the inspector to put it on.

Q I didn't understand you. The inspector put this chalk on?

A The inspector put this chalk on.

Q Then you don't know of your own knowledge

(Testimony of Chris P. Jensen.)

how much rolling this binder course had received before putting the chalk on?

A No.

Q Not of your own knowledge?

A Not of my own knowledge, no.

MR. EVARTS: I move at this time, if your Honor please, that this Exhibit N be stricken out on the ground that it is—

THE COURT: The motion is denied.

MR. EVARTS: All right; that is all.

MR. L. S. LYON: I will ask Mr. Jensen to take the stand.

— — — —

CHRIS P. JENSEN

called as a witness on behalf of defendants, in sur-rebuttal, being first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. L. S. LYON:

Q Please state your name.

A Chris P. Jensen.

Q You are the Chris P. Jensen who filed an affidavit in this case and are the surveyor who prepared the Type A specifications here involved, are you not?

A Yes, sir.

Q Will you please state what you had in mind as the reason for rolling the binder course in the Type A specifications prior to the time the finishing course was to be spread thereon?

(Testimony of Chris P. Jensen.)

MR. EVARTS: That is objected to as incompetent, irrelevant and immaterial. It has been fully covered in Mr. Jensen's affidavit, and I don't know that it is a question of the state of this man's mind that the court is interested in in any way.

THE COURT: Didn't he go into this in his affidavit?

MR. L. S. LYON: He stated the reasons why he preferred it.

MR. EVARTS: Why, he has page after page here—

THE COURT: That is what you are asking him about—the reason that he preferred it?

MR. L. S. LYON: No; there has been some information that he detailed, because he didn't want to violate this patent, and I wanted him to have an opportunity to state to the court that that was not the reason why he did, that is all.

MR. EVARTS: Well, that doesn't make any difference. We haven't made any such intimation, and even if we had—

THE COURT: The objection is overruled.

(Last question read.)

A My reasons were the result of observation covering a considerable period of time. The matter of the improvement of the riding surface of the pavement was brought to my attention first by Mr. Leyden, who complained that the riding surface or the very top surface of the warrenite pavement was punctured by rocks. These rocks, appearing at the surface, produced

(Testimony of Chris P. Jensen.)

a condition whereby moisture was admitted to the pavement—the structure of the pavement—and was therefore faulty because moisture entering into the structure of a pavement will gradually disintegrate it. In order to produce a better result and a more complete seal Mr. Leyden advocated the rolling of the coarser material so as to produce a smooth and fairly uniform surface upon which the thin sheet of asphaltic wearing surface, the finishing course, could be uniformly spread and thereafter rolled. I hesitated a considerable time—

MR. EVARTS: If your Honor please, this has all been gone into in this witness's affidavit.

THE COURT: I thought so, and a thing doesn't gain by being repeated—not with me.

MR. L. S. LYON: I did not have any intention of repeating the affidavit, your Honor; I wanted to show that the statement made by counsel that we had copied their specifications was not true, and that he got this up himself. I will limit the examination a little more.

Q It has been suggested, Mr. Jensen, that your specifications for Type A pavement are a copy or duplicate of the warrenite specifications. What have you to say about that?

MR. EVARTS: We object to that as entirely incompetent, irrelevant and immaterial. The specifications themselves are in evidence and they are the best evidence as to whether they are or not.

(Testimony of Chris P. Jensen.)

THE COURT: The warrenite specifications are not in evidence.

MR. EVARTS: Yes, your Honor.

THE COURT: Where are they in evidence?

MR. EVARTS: Introduced by ourselves; specification No. 2.

THE COURT: All right, then.

MR. L. S. LYON: If the court cares to wade through the figures to see the differences, that is all right; but the witness could make it clear to the court by just pointing out the differences briefly.

THE COURT: All right; it will save some trouble.

MR. EVARTS: Then we can do that in our briefs.

THE COURT: The objection is overruled.

Q BY MR. L. S. LYON: Confine yourself to the method of laying and the ingredients used in the finishing course, Mr. Jensen, and just point out whether your specifications are the same as the warrenite, and, if not, wherein they differ.

A May I ask for a copy of the specifications?

Q Yes.

MR. EVARTS: Now that can all be gone into in argument.

THE COURT: Well, I can read it myself. I thought you were going to be able to tell us in just a minute.

THE WITNESS: Very well; I can.

THE COURT: All right.

A The warrenite specifications call for a certain mixture of materials under one-tenth of an inch, com-

(Testimony of Chris P. Jensen.)

bined with asphaltum, and with asphaltic cement, and spread upon the binder course and then rolled. The Type A specifications involve a finishing surface mixture of somewhat different gradings of sand or fine material, together with a different proportion of asphaltic cement applied to the binder course after the binder course has been rolled.

Q BY MR. L. S. LYON: With particular reference to the fact that the specifications state that the finishing course, after compression, shall be at least one-quarter inch in thickness, did you obtain that quarter-inch dimension from the warrenite specifications, and if not from where did you obtain it?

A No, I didn't get that from the warrenite specifications. It was the thickness of a sheet asphalt mixture which I thought to be a proper thickness with which to seal the interstices of the rock appearing in the binder course, my ambition being not to produce a sheet asphalt pavement but simply one in which all the interstices would be filled so as to give us a perfect seal coat against the deteriorating effects of moisture.

Q Now did you observe the laying of the Type A pavement on Blackstone Avenue?

A Yes, sir.

Q What have you to say regarding whether or not the binder course was rolled prior to the time the finishing course was spread?

A The binder course was rolled prior to the application of the finishing course.

(Testimony of Chris P. Jensen.)

Q What have you to say regarding whether or not Exhibit I is a fair example of the binder course as it appeared on Blackstone Avenue after rolling and prior to the spreading of the finishing course(handing exhibit to witness)?

A I would say that that is a fair example of the appearance of the binder course on Blackstone Avenue.

Q You say similarly. In addition to the appearance, in regard to the condition of this binder course of Exhibit I and that on Blackstone Avenue at that point, in the laying.

A (Examining sample) The condition is very similar.

Q What do you know in regard to this Exhibit I? What part did you have in the preparation of that exhibit, Mr. Jensen?

A I simply gave instructions to Mr. Leyden that we wanted a sample of binder before the finishing course had been laid on.

Q And this was given you as a sample of that?

A Yes. When it came to me I—

Q You considered it a fair sample?

A I considered it a fair sample. I saw no reason to question it at all.

Q Now in regard to Plaintiff's Exhibit No. 18, what have you to say about that (handing sample to witness)? You might, in connection with that, also consider at the same time Plaintiff's Exhibit 19 and answer as to that (handing another exhibit to witness).

(Testimony of Chris P. Jensen.)

A Exhibit 19 appears to be a fair sample of Type A specification, no rock appearing on the immediate surface of the pavement, and very little appearing on the under side of the upper section of the sample. Exhibit No. 18 appears to be a piece of pavement not laid in accordance with the specifications controlling Type A construction.

Q In what respect, Mr. Jensen?

A Rock appears in the surface, and when properly laid such is not the case.

Q What section of the specification does that violate? Section 18?

A I will have to have the specification to find that.
(Document handed to witness.)

A Section 6, item 3.

Q What have you to say in regard to Defendant's Exhibit N, the chalk experiment?

THE COURT: What is section 6, item 3; what are you talking about?

A The item reads: "The finishing course, after thorough compression as hereinafter specified, shall be at least one-quarter inch in thickness and shall be composed of sand and asphaltic cement in the following proportions by weight", etc. This sample—I think it is a very good and a very fair example of Type A construction showing the binder course approximately an inch and a half thick and the finishing course one-quarter inch, approximately, thick—in some cases it may exceed one-quarter inch in thickness and in some cases it may be less than one-quarter inch in

(Testimony of Chris P. Jensen.)

thickness. The purpose of the experiment was to show that the finishing course does not blend with the binder course. French chalk is peculiar in that it cannot, by reason of its chemical nature, be absorbed into the structure of an asphaltic mixture, and therefore if the blending had taken place between the two courses the continuity of the French chalk would have been broken.

MR. L. S. LYON: You may inquire.

CROSS EXAMINATION,

BY MR. EVARTS:

Q Mr. Jensen, you say which one is a good one and which is not?

A No. 19 is a good sample of Type A construction, but No. 18 is not a fair example.

Q The evidence shows that these two pieces were taken out of a big piece and cut within a few feet of each other or a foot of each other or such a matter. If that were true you would still make that same answer, would you?

A I would.

MR. EVARTS: I think so. That is all, Mr. Jensen.

MR. L. S. LYON: That is all.

[Endorsed]: FILED NOV 29 1921 CHAS. N. WILLIAMS, Clerk, By Edmund L. Smith Deputy Clerk

2-390.

UNITED STATES OF AMERICA,
DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

To all to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true copy from the Records of this Office of the File Wrapper and Contents in the matter of the Letters Patent of Edwin C. Wallace, Number 959976, Granted May 31, 1910, for Improvement in Composite Pavements.

IN TESTIMONY WHEREOF I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the City of Washington, this 26th day of July, in the year of our Lord one thousand nine hundred and ten and of the Independence of the United States of America the one hundred and thirty-fifth.

[Seal]

F. A. Tennant

Assistant Commissioner of Patents.

Div. 15

2-437

NUMBER (SERIES OF 1900).

504,858

1909 (EX'R'S BOOK).

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156 245 5

PATENT NO. 959976

Name Edwin C. Wallace of East Auburn,

County of

State of California

Invention Composite Pavements.

Division of App., No.	PARTS OF APPLICATION FILED	, 190	filed	ORIGINAL		RENEWED.	
				Petition	June 28, 1909		, 190
				Affidavit	" " 1909		, 190
				Specification	" " 1909		, 190
				Drawing	" " 1909		, 190
				Model or Specimen	190		, 190
				First Fee Cash	\$15, June 28, 1909		, 190
				" " Cert.	, 190		, 190
				Appl. filed complete	June 28, 1909		, 190
				Examined	W. A. Cowles 3-24-'10		, 190
				Countersigned	W. W. Mortimer	For Commissioner	
					For Commissioner		
				Notice of Allowance	March 26, 1910		, 190
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				" " Cert.	190		, 190
				Patented	May 31		, 1910

Attorney

Addison G. Du Bois

#800 H. St.,

City

Associate Attorney Wm. W. Deane

800 H. St.,

City

Name

Patent No.

Serial No.

Date of Patent

The following patents are referred to in the Patent Office File Wrapper regarding Edwin C. Wallace Patent No. 959,976, as anticipations of Wallace Patent:

No. 691,708, issued to Frederick A. Malette January 21, 1902, for "Roadway."

No. 861,650, issued to Walter E. Hassam July 30, 1907, for "Artificial Structure And Process Of Making The Same."

No. 861,651 Issued to Walter E. Hassam July 30, 1907, for "Artificial Structure and Process of Making The Same."

(This patent No. 861,651 is not referred to in File (Wrapper, but is so close to No. 861,650, as to be a (clear anticipation.)

No. 918,156, issued to Frank S. Hutchinson April 13, 1909, for "Road Construction And Art Of Making Same."

No. 675,430, issued to Frederick J. Warren June 4, 1901, "for Pavement or Roadway."

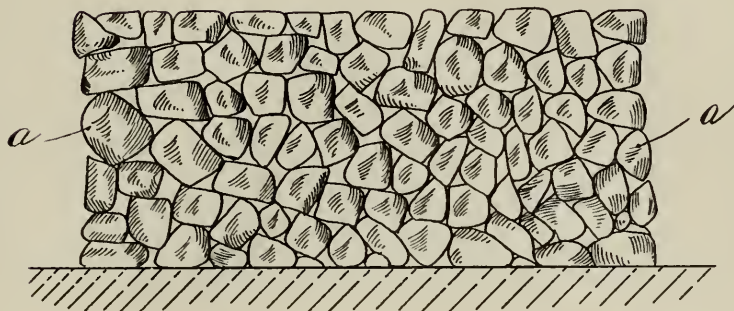
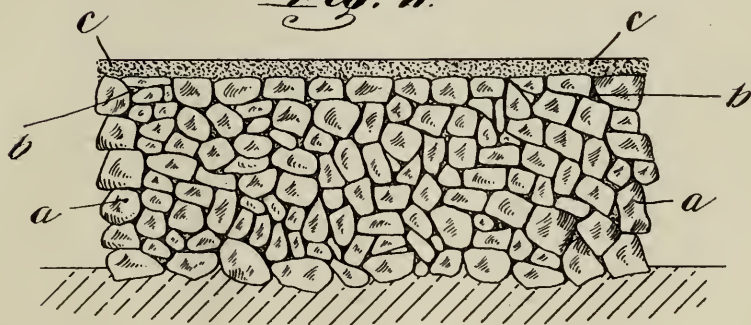
No. 768,699 issued to August E. Schutte August 30, 1904, for "Process of Laying Pavements."

No. 814,797 issued to John I. McDonald March 13, 1906, for "Pavement."

W. E. HASSAM.

ARTIFICIAL STRUCTURE AND PROCESS OF MAKING THE SAME.

APPLICATION FILED NOV. 30, 1906.

Fig. 1.*Fig. 2.*

Witnesses:

C. F. Mason.

E. M. Allen.

Inventor:

Walter E. Hassam

By Attorneys

Luthgate & Luthgate



Director,
U.S. Fish Commission,
Washington, D.C.

W. E. HASSAM.

ARTIFICIAL STRUCTURE AND PROCESS OF MAKING THE SAME.

APPLICATION FILED NOV. 30, 1906.

UNITED STATES PATENT OFFICE.

WALTER E. HASSAM, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO HASSAM PAVING COMPANY, OF WORCESTER, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

ARTIFICIAL STRUCTURE AND PROCESS OF MAKING THE SAME.

No. 861,650.

Specification of Letters Patent.

Patented July 30, 1907.

Application filed November 30, 1906. Serial No. 345,729.

To all whom it may concern:

Be it known that I, WALTER E. HASSAM, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Artificial Structure and Process of Making the Same, of which the following is a specification.

My invention relates to an artificial structure capable of use for foundations, walls, abutments, columns, floors, etc., but especially adapted for pavements for roads, sidewalks, and the like.

In a prior patent granted to me on the first day of May 1906, No. 819,652 I have described a structure in which, broken stone, gravel, or the like has been placed on the bottom of an excavation and rolled to compact the same, and the broken stone or gravel has been treated with a grouting or the like, subsequent to its rolling, and a suitable wearing surface has been placed thereon.

The principal object of this invention is to provide for improving the surface layer, and the improved surface layer can be used either with those constructions and methods which involve the use of previously coated stone, or with that which is carried out with uncoated stone afterwards grouted.

Reference is to be had to the accompanying drawings, in which

Figure 1 is a sectional view of a portion of an excavation with uncoated stone placed therein, ready to be compressed, and Fig. 2 is a similar view of the structure as completed constituting a pavement.

In carrying out the invention, the bottom of the excavation is preferably rolled, and then a layer of broken stone or gravel *a* is placed therein and rolled originally placed in position, and may be eight inches deep when until it is six inches deep.

In the preferred embodiment of the invention, the stone is placed in position in an uncoated state and rolled hard or compressed and thereafter grouted with a more or less thin cement grouting *b* to fill all the voids among the stone. The invention also may be carried

out and rolled. In either event, a layer of grouting *c* is placed on the layer of stones. If previously coated stones are used, this surfacing layer *c* has to be applied as a separate step of the process, but if uncoated stones are employed, the grouting is poured down upon them, not only until it fills the voids, but until the layer *c* is produced, so that this is a continuation of the grouting *b* and homogeneous therewith.

In order to produce a suitable surface on top of the pavement or other structure which is being made, uncoated fine or pea stones are rolled into the layer *c* before the cement has a chance to set or harden. The top layer *c* however, may be formed of a mixture of sand, cement, and fine pea stones preferably in substantially equal proportions, and a suitable amount of water and applied to the top of the layer of hard rolled stones.

While I have illustrated and described a preferred embodiment of my invention, I am aware that modifications may be made therein without departing from the spirit of the invention as expressed in the claims.

Having thus described my invention, what I claim is:—

1. An artificial structure comprising a foundation layer of hard rolled stone, having grouting filling the voids therein and a surface layer comprising a continuation of said grouting containing fine stones compressed into its surface.

2. A road or pavement consisting of a bottom layer of hard rolled uncoated stone, a grouting of cement placed upon said stone and filling all the voids therein, and a top layer of smaller uncoated stones compressed into the surface of said grouting before it sets.

3. A road or pavement consisting of a bottom layer of stone, a grouting placed upon said stone and filling all the voids therein, and a top layer of smaller uncoated stone compressed into the surface of said grouting before it sets.

4. The method of making a pavement which consists in rolling uncoated stone, placing a thin grouting thereupon, allowing the grouting to run down and fill the voids in the layer of stones, and compressing fine uncoated stones into said grouting before it sets.

In testimony whereof I have hereunto set my hand, in the presence of two subscribing witnesses.

WALTER E. HASSAM.

Witnesses:

C. F. Mason

E. M. Allen.

Inventor:

Walter E. Hassam.

By Attorneys

Smithgate & Smithgate

THE SAME

JULY 30, 1907.

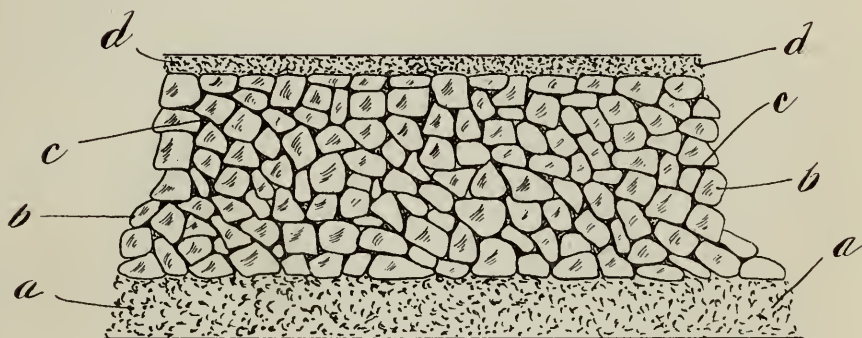
THE SAME

THE SAME

W. E. HASSAM.

ARTIFICIAL STRUCTURE AND PROCESS OF MAKING THE SAME.

APPLICATION FILED NOV. 30, 1906.



Witnesses:

C. F. Messon

E. M. Allen.

Inventor:

Walter E. Hassam.

By attorneys

Smithgate & Smithgate

WALTER E. HASSAM, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO HASSAM PAVING COMPANY, OF WORCESTER, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

ARTIFICIAL STRUCTURE AND PROCESS OF MAKING THE SAME.

No. 861,651.

Specification of Letters Patent.

Patented July 30, 1907.

Application filed November 30, 1906. Serial No. 345,730.

To all whom it may concern:

Be it known that I, WALTER E. HASSAM, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Artificial Structure and Process of Making the Same, of which the following is a specification.

My invention relates to an artificial structure capable of use for foundations, walls, abutments, columns, floors, etc., but especially adapted for pavements for roads, sidewalks, and the like. In such structures, broken stone or gravel has heretofore been placed on the bottom of an excavation and rolled to compact the same. The broken stone or gravel is treated with a grouting or the like, either previous or subsequent to its rolling, or simultaneously therewith. This grouting is in a more or less liquid state, and consequently is liable to run down below the bottom of the layer of stone or gravel and be lost and when there are holes or porous places under the broken stone the grouting is apt to run through the broken stone and thus leave the same bare in spots.

The principal object of the present invention is to provide a construction and method of making the structure of such nature as to avoid the loss of the liquid or semiliquid grouting in the manner set forth above, and especially to make a water-proof bottom to hold the grouting, and to provide a homogeneous foundation when the entire structure is grouted and rolled.

Further objects and advantages of the invention will appear hereafter.

Reference is to be had to the accompanying drawing which shows a cross section of a pavement constructed in accordance with this invention.

While this improvement is applicable to several methods of constructing pavements which have heretofore been known, it is of especial utility when applied to the form of pavement set forth and claimed in my previous patent No. 819,652 granted May 1st, 1906.

In that patent a pavement and method of making the same are described, in which the pavement comprises a bottom layer of hard-rolled stone, a grouting of cement placed upon the stone and filling the voids therein, and a suitable wearing surface placed on the grouting.

When a pavement is constructed in this manner, the grouting which is applied to the stone after it is rolled, is necessarily of such consistency that it will easily run through the voids among the stones, consequently, when it reaches the bottom layer, if there are further voids beneath it, it will enter them and portions

Referring to the drawing, I will now describe my method of making the pavement shown therein, so as to avoid these disadvantages and generally improve structures of this character. First an excavation is made, the bottom of which is rolled. Then a creamy grout *a*, preferably consisting of one part of cement to three or four parts of sand with water, is placed upon the bottom of the excavation. This may be a couple of inches thick. Then before this grouting has a chance to harden, the broken stone or gravel *b* is applied and rolled into the same. The rolling is designed to force the stones into intimate contact with each other so as to reduce the spaces between them, and to force the bottom stones into the layer or grouting *a*. In the preferred method of carrying out the invention the stones are rolled in their uncoated condition, although this invention may be carried out with stones previously coated with grouting. After the uncoated stone is thoroughly rolled and compressed, a grouting *c* is applied thereto, consisting of a thin mixture of cement, sand and water, which preferably is prepared immediately before it is to be used, and does not require excessive handling. All the voids are filled with this, and it is allowed to stand until it hardens. By the same time the grouting layer *a* will also have become hardened, so as to produce a homogeneous water-proof bottom to hold the grouting *c* which is applied among the stones, and prevent the wasting of the same. After the grouting has hardened, a surface *d* may be applied to the top of the pavement. In the form illustrated in the drawings, this surface consists of a thicker grouting of cement, sand and water, either mixed or not, with fine broken stone or gravel. When not mixed with this grouting the fine broken uncoated stone may be rolled into the top layer of grouting before it is set so as to make a smooth, but gritty surface.

While I have illustrated and described a particular structure and method of producing the same, I am aware that many modifications may be made therein by any person skilled in this art within the scope of my claims, and therefore, I do not wish to be limited to all of the features shown and described. For example, the particular order of procedure in producing the layers *b* and *d* may be considerably varied, and the layer *d* may be of any character suitable for producing the desired result.

Having thus fully described my invention, what I claim is.

1. An artificial structure comprising a homogeneous water-proof foundation layer, a layer of broken stone or

Witnesses:
 Frank L. Stutts.
 W. B. Hutchinson.

Frank L. Stutts, Inventor
 W. B. Hutchinson, By his Attorney

bottom layer of grouting, an intermediate layer of broken stone or gravel provided with a grouting filling the voids among the stones and supported by and compressed partly into the first mentioned layer, and a top layer having a suitable wearing surface.

3. A structure for the purposes described, comprising a bottom layer of grouting, an intermediate layer of hard rolled uncoated stone, a grouting of cement placed upon said stone and filling the voids therein down to said bottom layer, and a suitable surface layer of grouting and stones placed on the top of said intermediate layer.

4. The method of constructing a pavement or the like which comprises excavating, placing a layer of grouting upon the bottom of the excavation, placing a layer of broken stone or gravel above the grouting, compressing the same until the voids are small, grouting the stone for

the purpose of filling the voids among the stones, and applying a suitable wearing surface.

5. The method of constructing a pavement or the like, which comprises excavating, rolling the bottom of the excavation, applying a coating of creamy grouting comprising sand and cement, then before said grouting has hardened, compressing a layer of uncoated stone on the surface of said grouting, and applying a thinner grouting to the compressed stone for the purpose of filling the voids therein down to the top of the first layer of grouting. In testimony whereof I have hereunto set my hand, in the presence of two subscribing witnesses.

WALTER E. HASSAM.

Witnesses:

LOUIS W. SOUTHWATE,
MARY E. BEGAN.

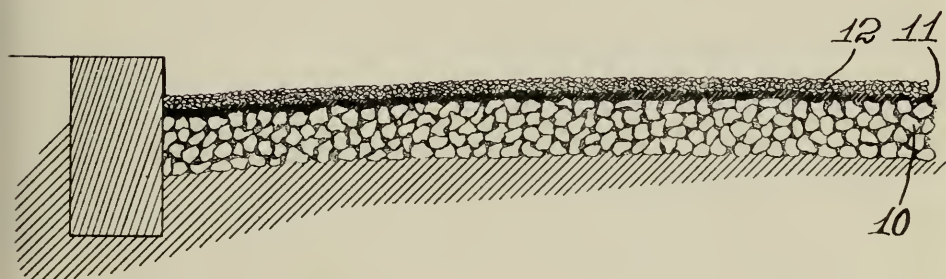
F. S. HUTCHINSON.

ROAD CONSTRUCTION AND ART OF MAKING SAME.

APPLICATION FILED MAY 18, 1908.

18,156.

Patented Apr. 13, 1909.



Witnesses:

Frank L. Stubbs.

Wm. Lancaster.

Frank S. Hutchinson, Inventor.

By his Attorney
W. B. Hutchinson.

J. I. McDONALD.
PAVEMENT.

APPLICATION FILED JAN 20 1906

UNITED STATES PATENT OFFICE.

FRANK S. HUTCHINSON, OF FLUSHING, NEW YORK.

ROAD CONSTRUCTION AND ART OF MAKING SAME.

No. 918,156.

Specification of Letters Patent.

Patented April 13, 1909.

Application filed May 18, 1908. Serial No. 433,500.

To all whom it may concern:

Be it known that I, FRANK S. HUTCHINSON, of Flushing, Queens county, New, York, have invented a new and useful Improvement in Road Construction and Art of Making Same, of which the following is a full, clear, and exact description.

My invention relates to improvements in the construction of highways, and the object of my invention is to produce a comparatively simple and inexpensive road which can be laid without the use of expensive machinery, and in which the fine materials of the road are sealed in with the coarser parts so that a smooth permanent surface is formed.

Usually in road construction of the macadam or telford type, broken stone of coarser and gradually finer sizes are laid in the road, and rolled, the voids filled with the sand or finer crushed stone, the materials being finer as they approach the surface. Sometimes the surface is also provided with a binder of some sort, but generally the fine material used to fill the voids between the coarser particles is not provided with adhesive matter, and consequently when the surface begins to be broken, the finer material is shaken down or sucked up, and in a short time the larger rocks begin to protrude and the road is practically ruined. This is especially true in recent years where so many fast automobiles are used, as these vehicles move with such rapidity that the suction caused has a tendency to draw up the finer materials of the road-bed, and so the road is rapidly ruined. Moreover, the tires of these heavy vehicles have a tendency to break up the surface, and once the surface is broken the finer parts of the road are quickly removed.

My invention contemplates the use of a binder, preferably of bituminous materials such as coal tar or asphalt, and I use it in such a way as to stick together the whole body of the road and form a seal over the coarser parts, thus preventing the breaking up of the road, and the sucking up of the finer particles. In carrying out this idea, I provide a layer of broken stone, and fill the surface with a practically uniform size, and fill the

voids absorb the binder and cause the larger and smaller particles to closely adhere. I use more than sufficient binder to cover the broken stone and into the covering of binder I roll the finer covering of the road, which is preferably of crushed stone, and thus a complete roadway is provided which is cheap, easily laid and durable. The details of this structure will be shown more clearly in the description which follows.

Reference is to be had to the accompanying drawing forming a part of this specification.

The figure is a broken cross section of a road-bed showing my improvements.

The road-bed can be made with one, two, or more courses of broken stone. Where a single layer of the broken stone 10 is used, this is applied in the usual way, though the particles are preferably of a uniform size, and after the layer is placed in position the stone is preferably rolled heavily so as to settle as much as possible. Over this layer of broken stone I spread sand, gravel, or finely crushed rock, which is brushed or otherwise thoroughly worked into the stone, and preferably so that none of the fine material will appear above the stone surface, but rather should be just below the surface.

Over this stone I then spread my bituminous binder of coal tar, asphalt, or analogous materials, and this is taken up by the filler between the stones so that the stones and filler form a homogeneous or compact bed. The binder is put on in sufficient quantity to thoroughly saturate the surface of the filler and work up above the stone tops so as to be absorbed by the covering of crushed rock or other fine material which forms the surface of the road, and is thoroughly rolled so as to be incorporated with the binder, and thus a complete homogeneous mass is formed with the broken stone and the filler at the bottom, and the binder and covering at the top, and it will be seen that the mass is so thoroughly fastened together that swiftly running vehicles cannot possibly suck up the filler and that heavy traffic will not quickly disturb the parts. If the road is laid in more than one course, the broken stone or rock is placed at the bottom and rolled, a second course of

William L. Jewell
Richard H. Tucker.

John A. Whitney
Attorney

I am aware that it is not new to use a binder in road construction, but I am not aware that the binder has been used in connection with a filler for the broken stone and in a way to be incorporated with the covering as specified, whereby a practically uniform solid mass with a dense, fine, coherent covering is produced.

It will be seen that no expensive machinery is needed to lay this road, but that the ordinary crushed stone is used, and a roller is the only implement needed to produce a perfect road-bed.

Having thus fully described my invention,

I claim as new and desire to secure by Letters Patent:—

The herein described improved roadway, comprising a layer of broken stone, a fine filler mingled with the stone and with a bituminous binder which is absorbed by the filler and overflows to form a covering for the stone, and a surface formed of crushed rock rolled into the binder.

FRANK S. HUTCHINSON.

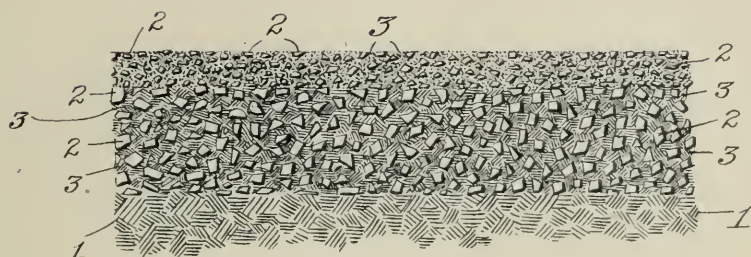
Witnesses:

WARREN B. HUTCHINSON,
WILLIAM S. DENISON.

J. I. McDONALD.

PAVEMENT.

APPLICATION FILED JAN. 30, 1905.



Witnesses

Edwin L. Jewell

Richard H. Tucker.

Inventor

John I. McDonald

By

Geo. W. Chittenden

Attorney

UNITED STATES PATENT OFFICE.

JOHN I. McDONALD, OF ST. JOSEPH, MISSOURI.

PAVEMENT.

No. 814,797.

Specification of Letters Patent.

Patented March 13, 1906.

Application filed January 30, 1905. Serial No. 243,296.

To all whom it may concern:

Be it known that I, JOHN I. McDONALD, a citizen of the United States, residing at St. Joseph, in the county of Buchanan and State of Missouri, have invented new and useful Improvements in Pavements, of which the following is a specification.

My invention relates to paving, its object being to enable the construction in a relatively cheap and simple manner of a broken-stone or macadam roadway of high efficiency and great durability. It is well known by engineers that the efficiency of such roadway depends very largely upon the character of the filler employed to close the voids between the fragments of stone, the effectiveness of such filler or binder in maintaining the compactness and solidity of the roadway varying with the cementitious or holding properties of the material used. Clay, sand, or stone screenings are ordinarily employed for this purpose, but are subject to the defects that they are dissolved to greater or less extent by water, are easily eroded by heavy rains, and, on the other hand, lose what little binding power they possess in periods of continued drouth, allowing the roadway to "ravel" or become loose and rough, and if the same is built upon a considerable grade to subject the paving to serious damage by ensuing rains. In addition, roadways so constructed are exceedingly dusty in dry weather and muddy in wet and are difficult to clean under all conditions without detriment to the surface. I am aware that effort has been made to meet these difficulties by the use of coal-tar and similar substances and in late years of various compositions in which refined asphalt is the important ingredient. All such compositions have to be heated to the fluid state and poured upon the stone fragments already spread *in situ* or first mixed therewith by mechanical means. This process manifestly demands a plant for the preparation of the composition, expertness in the procedure, and much expense in material employed.

My invention contemplates the use of a natural bituminous stone in a ground state for such binder. The stone which is found

States and Territories, is simply ground to a sufficient fineness to allow it to readily sift into the voids and is then spread in proper proportion upon the layer of stone or gravel *in situ* and the whole rolled, as usual in laying macadam. The presence of the bitumen or asphalt not only gives such natural filler enormously increased holding power upon the fragments, but under rolling and subsequent traffic the filler becomes as hard and compact as the stone, making a roadway free from dust, waterproof, easily cleaned and washed, and highly durable. Its durability is further enhanced by the fact that under the heat of the sun in warm weather the binder softens sufficient to permit the fragments of stone to rescat themselves under the traffic, and thus maintain the smoothness and integrity of the roadway.

In practice it is not essential that the whole body of the pavement be laid as above described. The lower stratum acting as a base may be constructed with the use of any convenient filler and the wearing-surface preferably three or four inches deep, as above. It is advisable also in laying the wearing-surface to put it down in relatively thin successive layers, so that the natural-stone filler may have every opportunity to thoroughly fill the voids to repletion before the final rolling.

The accompanying drawing represents a vertical section of a piece of pavement embodying my invention.

On a concrete base 1 is built up the mixture of broken stone 2 and bituminous filler 3, as above set forth, the upper layers being preferably composed of smaller fragments of stone than the lower ones.

What I claim is—

1. A pavement composed of hard broken stone and a binder of ground natural bituminous stone mixed and rolled without heating.

2. A pavement having its upper portion composed of hard broken stone mixed with a binder of finely-ground natural bituminous stone.

3. A pavement having a foundation of macadam, and a top portion of hard broken stone, the voids being filled with a binder of ground

4. The process of making a pavement which consists in grinding natural bituminous stone, mixing it with hard broken stone to constitute a binder therefor, spreading the mixture on a suitable foundation, and subjecting the whole to heavy pressure.

In testimony whereof I have signed my

name to this specification in the presence of two subscribing witnesses.

JOHN I. McDONALD.

Witnesses:

JOHN S. EDWARDS,

G. A. TRENHOLM.

\$15.00 RECEIVED Serial No. 504,858 Paper No. 1

JUN

28 H

1909

CHIEF CLERK, U. S. PATENT OFFICE

PETITION

To the Commissioner of Patents:

Your petitioner (1) Edwin C. Wallace citizen of the United States residing at East Auburn in the County of Placer and State of California, and whose Postoffice address #306—South Str., Jamaica Plain, Boston, Mass., prays that Letters Patent may be granted to him for the improvement in Composite Pavements set forth in the annexed Specification.

And he hereby appoints (2) Addison G. Du Bois of #800—H Street, N. W. Washington, D. C., ~~of~~ Register No. 1404, his Attorney with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to sign name to the drawings, to receive the Letters Patent, and to transact all business in the United States Patent Office connected therewith.

Signed at Washington ~~in the county~~ of District of Columbia, ~~and State of~~ this 28th day of June 1909.

Edwin P. Wallace

(Notarial Seal)

SPECIFICATION

To all Whom it May Concern:

BE IT KNOWN That I, Edwin C. Wallace citizen of the United States residing at East Auburn in the County of Placer, and State of California have invented certain new and useful improvements in Composite pavements of which the following is a specification:

My present invention has relation to composite pavements; and it contemplates the provision of such a pavement, adapted to be expeditiously laid at small cost of skilled-direction, apparatus, labor and material, and one having a surface-coating or upper course that is rendered impermeable to the elements without the use of so much comminuted or other fine material that the surface-coating mixture is "mushy" in character and **also having** a lower course possessed of rigidity, so that the pavement as a whole is well calculated to withstand the conditions and the usage to which composite pavements are ordinarily subjected.

In the drawing, accompanying and hereby made a part hereof:

The figure is a vertical sectional view of a portion of a composite pavement produced in accordance with my invention.

The invention alluded to consists in a process of producing a pavement and in the pavement, the product of the process, and for the sake of convenience and brevity I will describe in detail the fabrication of the pavement from which description considered con-

junctively with the lettered drawing both the process and the pavement produced by the practice of the process will be fully understood. 7475

By reference to the drawing it will be seen that A is a prepared foundation which I would emphasize may be of any character consonant with the purpose of my invention. B is the lower course of the novel and advantageous pavement, and C, the upper course or surface-coating thereof.

In laying a pavement in accordance with my invention, I make use of stone of a size to pass through screen giving a stone, the largest of which is the maximum size desired, the interstices of a \wedge ~~one and one-half inch~~ screen, and this stone together with smaller pieces of stone and comminuted stone or dust, in the state that the whole run is discharged from a crusher, I mix with sufficient bitumen, of proper consistency, to form a homogeneous mass, and in that way produce the first or lower course B, disposed on the foundation A, as illustrated. I also make use of a fine bituminous mixture—i. e., a mixture produced by commingling either sand or crusher-screenings (comminuted-stone) or both with sufficient bituminous or asphaltic cement to form a homogeneous mass. This bituminous mixture I spread in a thin coat or layer over the course B laid as before described but not compressed or subjected to pressure or tamping, and in that way produce the upper course or surface coating C. I then subject the laid material—i. e., the material comprising courses B and C, to initial pressure or compres-

sion, preferably by moving a heavy roller over the same, and by so doing not only compress the two courses to the extent necessary but tie or bind the

7476

upper or surface-coating course C to the lower or stone-mixture course B, and provide a dense surface layer or course without in any way proportioning the amount of fine material used in connection with the coarser stone.

Attention is here invited to the fact that while I describe the pavement made in accordance with my invention as having two courses B and C, the completed pavement is not multi-layer pavement, but on the other hand the two courses are practically pressed, by the single compression referred to, into a single mass. This is materially advantageous inasmuch as it assures the production of a pavement, the lower portion of which is possessed of the required rigidity, and the upper portion or surface of which is *dents* and impermeable and is adapted to close or seal to advantage and without tendency of separating, and this without the employment of a large amount of fine material which is objectionable because of its liability to render the mixture mushy.

I would also direct attention to the fact that while my improvements assure a rigid lower portion and a top surface sealed to the elements, which are the essential properties of a good wearing pavement, the pavement is adapted to be quickly and cheaply made; the material of the first course B being spread upon the previously prepared foundation to the required

depth, and the upper course or surface-coating C being raked in a thin layer over the material B and brought to a true surface before the application of the only pressure to which the composite pavement is subjected. In this connection it will be appreciated that the single compression of the whole mass simplifies and cheapens the production of the pavement and instead of preventing or interfering with the adherence of the upper course to the lower course (as is in the case when the lower course is rolled or otherwise pressed precedent to the application and pressing of the upper course) is utilized to effect a bonding of the upper course to the lower course for the purpose before described, and to render the whole mass compact and durable.

Among other advantageous characteristics of my invention, it may be stated that only little apparatus is required for the mixing and that of inexpensive only character; that a slight care is required in handling and laying materials; that inasmuch as the fine mixture in the thin or surface course C is used at the surface only instead of being distributed throughout the whole mass a comparatively small quantity of the fine mixture is required; that in the making of the first or lower course B a hard bitumen may be employed and in small quantity; and that because of adding the fine material—i. e., course C to the course B before compression a firm and durable bond is attained; the materials of the two

courses being united at the top of the pavement in one integral or homogeneous mass that presents a smooth surface and one possessed of durable capacity.

While, of course, C is added in one principal coat or layer may be added from time to time during the process of laying if required in order to cause the surface to seal or close up in spots requiring more fine mixture. Per Ex. Amend.

I have of course specifically disclosed the best practical embodiment of my invention of which I am cognizant, but it is obvious that in the future practice of the invention such changes may be made as do not involve departure from the scope of my invention as claimed.

Having described my invention, what I claim and desire to secure by letters patent is:

1—The process of laying a pavement, which consists in placing upon a suitable foundation a course of stone commingled with binding material, then placing upon the said first course as placed upon the foundation, a thin course of finely-divided material commingled with binding material, and then subjecting the whole mass to pressure to unite the materials of the courses in one integral mass at the top of the whole mass. Sub. C¹

2—The process of laying a pavement, which consists in placing upon a suitable foundation a course of broken stone commingled with bitumen of proper consistency, then placing upon the said first course, before rolling or other pressing thereof, a thin course of finely-divided material commingled with bituminous

or asphaltic cement, and then subjecting the whole mass to an initial pressure to unite the materials of the courses in one integral mass at the top of the whole mass.

3—A pavement comprising a foundation, a lower course, of stone commingled with binding material, disposed upon the foundation, and an upper thin course, of finely-divided material commingled with binding material, disposed upon the lower course; the materials of the two courses being pressed into an integral or homogeneous mass at the top of the whole mass, substantially as and for the purpose set forth.

Per B Sub A²

4—A pavement comprising a foundation composed of large pieces of stone, smaller pieces of stone and stone dust

Per A lower course of broken stone Δ commingled and

“ “ with bitumen of proper consistency Δ disposed upon the foundation, and

Per B an upper thin course, of finely-divided material

“ “ commingled with bituminous or asphaltic cement and initially compressed simultaneously with the lower course and thereby tied or bound thereto

“ “ ment disposed upon the lower course Δ the materials of the two courses being pressed into an integral or homogeneous mass at the top of the whole mass, substantially as and for the purpose set forth.

Sworn to and subscribed before me this 28th day of
June 1909

Maude H. Yates
Notary public

(Notarial Seal.)

[Endorsed]:

PETITION, POWER OF ATTORNEY, SPECIFICATIONS AND OATH. In the United States Patent Office IN THE MATTER OF THE APPLICATION OF Edwin C. Wallace FOR Letters Patent FOR Composite Pavements

FILED BY Addison G. DuBois, #800—H. Street,
N. W., Washington, D. C.

MAIL ROOM

JUN

28

1909

U. S. PATENT OFFICE.

ASSOCIATE POWER OF ATTORNEY.

The Honorable Commissioner of Patents:

Please recognize William W. Deane of #800 H. St., N. W. Washington, D. C., Registry No. 1816, as Associate Attorney in the prosecution of the application of Edwin C. Wallace, filed June 28, 1909, Serial No. . . . , for improvements in Composite Pavements, with the usual powers, and address all communications relating thereto to him.

Signed at Washington, D. C. this 28th. day of June,
1909.

A. G. Du Bois

2-260

Div. 33 Room 164

ADDRESS ONLY THE

COMMISSIONER OF PATENTS

WASHINGTON D. C.

Paper No. 2 (Rej.)

All communications respecting
this application should give the
serial number, date of filing, and
title of invention.

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,
WASHINGTON, D. C., Aug. 23, 1909.

MAILED “ “ “

E. C. Wallace,

Care Wm. W. Deane,

Washington, D. C.

DIV. 33

Please find below a communication from the EX-
AMINER in charge of your application, #504,858,
filed June 28, 1909 for “Composite Pavements.”

E. B. Moore.

Commissioner of Patents.

The following references are cited:

Malette, 691,708, Jan. 21, 1902, 94-Concrete.

Hassam, 861,650, July 30, 1907, “ “

Hutchinson, 918,156, Apr. 13, 1909, “ “

Claims 2 and 3 are objected to for the reason that
they endeavor to define the structure by the method
of defining the same in the clause “the materials of

the two courses being pressed into an integral or homogeneous mass at the top of the whole mass."

Claims 1 and 2 define nothing whatever patentable over the reference to Hassam and are rejected thereon. It is regarded as not being a patentable change in omitting a step in the process, namely the compression or rolling of the first layer of stone over what is disclosed by the reference. The rolling of the stone before the second course or binder is applied certainly makes a much more solid and denser pavement than if the rolling were done after the application of the binder or second course. Accordingly, it is believed that the omission of the step in the process results in a distinct difference of finished structure.

Claims 3 and 4 are rejected upon the same reference.

The other references cited show further the state of the art.

G. C. Wedderburn

C M R

Act. Examiner Div. 33.

Serial No. 504,850 Paper No. 3

Room 164:

Amendment A

In Application:

E. C. Wallace:

Composite Pavement:

Filed June 28, 1909:

Ser. No. 504,858:

APPLICATION ROOM

SEP.

15

1909

U. S. PATENT OFFICE U. S. PATENT OFFICE.

SEP 16 1909

DIVISION 33.

Hon. Comr. of Patents,

Sir:

Replying to the office letter of Aug. 23, 1909, this application is hereby amended as follows: cancel claims 1 and 2 and substitute:

1—The process of laying a pavement, which consists in placing upon a suitable foundation a course of stone commingled with binding material, then placing upon the said first course before compression thereof, a thin course of fine-divided material commingled with binding material, and then initially pressing the courses to compress the same and tie or bind the upper course to the lower course.

Per B.

A¹ 2 1 The process of laying the pavement, Sub C¹ which consists in placing upon a suitable foundation a course composed of large pieces of stone,

Per B smaller pieces of stone and stone dust and mixed sufficient bitumen of proper consistency to form with \wedge bitumen into a homogeneous mass, then

Per B placing upon the said first course, before compression thereof a thin course composed of

B¹ sufficient finely divided material mixed with \wedge to form

Insert bituminous or asphalt cement \wedge into a homo-

B² geneous mass, and then initially pressing the courses to compress the same and \wedge tie or bind B¹

the upper course to the lower course.—

In claim 3, erase the matter commencing with the semi-colon of line 5 and ending with line 9, inclusive, and insert - - ~~and initially compress~~
 A² ~~simultaneously with the lower course and thereby tied or bound thereto - -.~~

Per B In claim 4, erase the matter commencing the semi-colon of line 6 and ending with line 9, inclusive, and substitute - - and initially compressed simultantously with the lower course and thereby tied or bound thereto - -. Also in claim 4, line 2, erase, "of broken stone" and insert - - composed of large pieces of stone, smaller pieces of stone and stone dust - -. Line 3, before "disposed" insert - - and - -.

REMARKS

The Hassam pavement is essentially a multi-layer pavement because of the individual hard rolling of the lower layer, and it is therefore not appreciated how the same can be held to anticipate claims 1 and 2 in which the lower and upper courses are defined as initially pressed together after the placing of the latter on the former, and the upper course is bound to the lower course as a whole and assures a dense surface course without in any way proportioning the amount of fine material used in connection with the coarser stone. In the Hassam process there is clearly no anticipation or suggestion of compressing a lower and an upper course initially together, and therefore the stones rolled into the layer c (lines 55 and 56 of Hassam's specification) are bound to the grouting alone.

"The rolling of the stone before the second course or binder is applied" alluded to by the Examiner would defeat the aforesaid end that applicant seeks to attain, and is expressly disclaimed in applicant's specification, page 5, lines 4 to 12.

For the reasons stated allowance of claims 1 and 2 is solicited.

Claims 3 and 4 are now free of the formal objection urged against said claims as originally presented, and are thought allowable because Hassam does not anticipate the lower and upper courses initially compressed together and as a whole into a homogeneous mass, and does not anticipate the specific lower course and upper course of claim 4. Allowance of these claims is also solicited.

Respectfully submitted,

E. C. Wallace,

By Wm. W. Deane.

His Attorney

Wash. D. C.

Sep't. 15 '09.

Div. 33 Room 164

ADDRESS ONLY

THE COMMISSIONER OF PATENTS

WASHINGTON, D. C.

Paper No. 4 (Rej.)

All communications respecting this application should give the serial number, date of filing, and title of invention.

I A D

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,
WASHINGTON, D. C.,

Oct. 7, 1909

E. C. Wallace,

MAILED " 8, 1909

Care Wm. W. Deane,

Washington, D. C.

Div. 33

Please find below a communication from the EX-AMINER in charge of your application, 504,858, filed June 28, 1909, for "Composite Pavements."

E. B. Moore

Commissioner of Patents

Replying to amendment of Sept. 15, 1909.

The following new references are cited:

Warren, 675,430, June 4, 1901,

Schutte, 768,699, Aug. 30, 1904, 94-1.

McDonald, 814,797, Mar. 13, 1906, " Concrete Layers.

Claims 1 and 2 define nothing of a process over what is disclosed in lines 50-56, inclusive, of the specification of McDonald and are accordingly rejected thereon. It is entirely immaterial, insofar as the process is concerned, whether the course of stone be *comingled* with a binding material or not. The whole process lies in the application of a binder or filling material to the layer of stone and then rolling these layers into a compact integral mass. Such expedient is clearly anticipated by McDonald. It does not make any difference, in so far as the process is concerned, whether

the stone be coated or not or whether the stone consists of several grades or of what material the course is composed, the series of acts necessary in laying the pavement is the same.

The claims are further rejected upon Warren. Attention is called to claim 2 thereof. Because applicant stops short of what Warren discloses does not

a
make out \wedge patentable process. Attention is called to a mere reversal of applicant's process in the patent to Schutte.

Claims 3 and 4 are still open to the objection as attempting to define the finished structure by the method of making the same. In so far as the finished structure is concerned, it is immaterial what the steps of the process may be. Claims 3 and 4 are rejected upon Hassam, of record. It is taken to be a mere matter of choice or expediency whether several grades of stone produces any different composition or different result over the composition of coarse stone mixed with a binding material, shown in the reference.

CMR

W. A. Cowles
Examiner Div. 33.

APPLICATION ROOM

OCT
25
1909

Serial No. 504858 Paper No. 5
Amendment B
U. S. PATENT OFFICE
Oct 26 1909

m
Roo \wedge 164:
In Application:
Edwin C. Wallace:

Composite Pavements:

Filed June 28, 1909:

Ser. No. 504,858:

Hon. Com. of Patents,

Sir:—

Replying to the office letter of Oct. 7 '09, this application is hereby amended as follows:

In claim 2, line 4, erase "bitumen into" and insert—
sufficient bitumen of proper consistency to form—.

Line 7, after "with" insert—sufficient—. Line 7, erase
"into" and insert—to form—. Line 9, before "tie"

insert—unite the bitumen and stone dust with the
bituminous or asphaltic cement and 'B thereby—

per C Cancel claims 1, 3 and 4.

Change the ordinal of claim 2 to "1," and
add the following claims:

2—A pavement comprising a foundation, a
lower course thereon made up of large pieces
of stone, smaller pieces of stone and stone dust
commingled with sufficient bitumen of proper
consistency to render the course a homogeneous

Per C¹ mass, and an upper thin course thereon made up
of finely-divided material commingled with suf-

B² ficient bituminous or asphaltic cement to ren-
der the upper course a homogeneous mass; the
bitumen and stone dust of the lower course being
united with the bituminous or asphaltic cement
of the upper course, and the two courses being
thereby connected together—.

REMARKS

The two claims now asserted are thought to be clearly allowable over McDonald, Hassam and the other references.

Regarding the process claim 1 (former 2) it is urged that it is highly important to the process that the lower course contain stone dust and sufficient bitumen to render said course a homogeneous mass and that the upper course consist of finely divided material and sufficient bituminous or asphaltic cement to render the course a homogeneous mass, since then when the two courses are subjected to the initial compression the bitumen and stone dust of the one are united to the bituminous or asphaltic cement of the other and the two courses are tied or bonded together. There is here a step forward in the art and clear patentable novelty over each of McDonald, Hassam and the other references, and allowance of the claim is therefore solicited.

Claim 2 to the pavement is not open to the technical objection offered by the Examiner to the original pavement claims, and it is thought to be allowable for the reasons hereinbefore set forth as warranting the allowance of claim 1. Allowance of claim 2 and the application is also solicited.

Respectfully submitted,

Edwin C. Wallace,

By Wm W. Deane.

His Attorney.

Oct. 25 '09.

Div. 33 Room 164

ADDRESS ONLY

THE COMMISSIONER OF PATENTS

WASHINGTON, D. C.

Paper No. 6 (Rej.)

All communications respecting
this application should give
the serial number, date of fil-
ing, and title of invention.

I A D

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,
WASHINGTON, D. C.,

E. C. Wallace,	MAILED	Nov. 11, 1909.
Care Wm. W. Deane,		" 13, 1909
Washington, D. C.		DIV. 33

Please find below a communication from the EX-
AMINER in charge of your application, 504,858,
filed June 28, 1909, for "Composite Pavements."

E. B. Moore,

Commissioner of Patents.

Replying to amendment of Oct. 25, 1909.

Claim 1 is again rejected on the references of record
to McDonald or Warren. It is considered all the
novelty in so far as a process has been defined in the
claim, has been anticipated by the references. The
process relates to the laying on or superposition of one
layer on the other and subsequently rolling the same

to bring these layers together to form an integral mass; that applicant defines layers of different composition from what is disclosed in the reference is entirely immaterial. The various steps in the process are independent of the specific material used. It is believed and will be insisted upon that unless applicant can show a patentable difference in the actual steps in his alleged process over what the references show that no process has been defined.

Claim 2 it is believed makes out no patentable distinction over Hassam, of record, and is rejected thereon. In the first course of this reference, coarse stones and fine stone are coated and a filler of sand cement and small stones is applied thereto and rolled in, all intimately uniting into one mass. It is held that since cement is defined in this reference that any cement may be used, as asphalt, bitumen or portland cement. All that applicant defines in the claim over this reference is the stone dust, which is not deemed sufficient to warrant patentability. The claim is rejected along the same lines upon the reference to McDonald of record.

W. A. Cowles.

Ex

C. M. R.

APPLICATION ROOM.

NOV

22

1909

Serial No. 504858 Paper No. 7

Amendment C

U. S. PATENT OFFICE U. S. PATENT OFFICE
NOV 23 1909
DIVISION 33.

Room 164:

In Application:

Edwin C. Wallace:

Composite Pavements:

Filed June 28, 1909:

Ser. No. 504,858:

Hon. Comr. of Patents,

Sir:—

Replying to the office letter of Nov. 11 '09, this application is hereby amended as follows:

In the specification, page 4, after line 4, insert: "The desirable ends stated are due to the fact that the initial compression of the lower and upper courses together forces the fine mixture to blend with the coarse mixture at the top of the mass."

Cancel the claims and substitute:

1—The process of laying a pavement, which consists in placing upon a suitable foundation a course composed of large pieces of stone, smaller pieces of stone and stone dust, mixed
C¹ with sufficient bitumen of proper consistency to
Sub. thoroughly coat all of the particles, then placing
E¹ on said first course, prior to compression thereof, a thin course composed of finely-divided mineral matter mixed with sufficient bituminous binding material to thoroughly coat all of the particles, and then initially compressing the courses to compact the same and force the fine mixture to

per D blend with the coarse mixture at the top of the causing the bitumen and bituminous binding material to firmly bond

“ “ mass, thereby ~~firmly bonding~~ the two layers into one and forming one compact rigid layer densest at the top—

2. A pavement comprising a foundation, a lower course thereon made up of large pieces of stone, smaller pieces of stone and stone dust, C¹ mixed with sufficient bitumen of proper consistency to thoroughly coat all of the particles, and an upper thin course disposed on the lower course made up of finely-divided mineral matter mixed with sufficient bituminous binding material to thoroughly coat all of the particles, and blended with the coarse mixture at the top of bonded

per D the mass, whereby the two layers are ~~bonding~~ into one and a compact rigid layer densest at the top is formed—.

Insert

F¹

REMARKS.

This application has been very carefully amended after consultation with the applicant who is a practical and well-posted pavement constructor, and the following discussion of the bearing of the references clearly sets forth his views.

In Mallette's process where the coarse layer is compacted and the fine mixture is not, except by traffic, the bituminous cement forms the only bond between

the layers. In applicant's process by not compacting the coarse layer until after the application of the fine mixture, the bituminous cement is not the only bond between the layers. In fact there ceases to be any line of demarkation between the layers, the layers being so blended that they cannot be separated.

McDonald lacks the lower coarse composed of large pieces of stone, smaller pieces of stone and stone dust, mixed with bitumen, combined with an upper thin course of finely-divided mineral matter mixed with sufficient bituminous binding material and forced to blend with the coarse mixture at the top of the mass. At this point it is desired to emphasize the fact that without the bitumen in the lower coarse layer and the finely-divided mineral material and bituminous material in the upper layer, the initial compression of the courses together would not force the fine mixture to blend with the coarse mixture at the top of the mass and would be without effect so far as the bonding of the two mixtures together is concerned. From this it follows that applicant's invention as defined in process claim 1 depends upon the materials employed in the two coarses as well as in the steps followed.

In Warren's specification, page 1, line 60-65 it is stated that the layer B of smaller stone than the foundation layer A of stone, which smaller stone is coated with coal-tar or the like, "is thoroughly rolled

* * *. Upon and into this prepared surface is then thoroughly rolled a heavy layer * * * composed,' of a mixture of "coarse particles, fine powder and coal tar or the like. The application of layer C

after the thorough rolling of the layer B entirely or the thorough rolling of the layer C previous to the application of the finishing coating E is contrary to the essential feature of applicant's process—viz: the placing of the upper course on the lower course previous to any rolling or compression, and renders the Warren mode of procedure very dissimilar from applicant's.

On the grounds stated claim 1 is confidently believed to be patentable, and inasmuch as the references are not anticipations it is submitted that the Examiner must at least have some doubt as to its patentability. This doubt the Examiner is solicited to resolve in applicant's favor and allow the claim.

Regarding claim 2 it is urged that neither Hassam nor McDonald have the lower specific course of large stone, small stone, stone dust and bitumen combined with the upper course of finely-divided mineral material and bituminous material that is forced into a blended state with the lower course so that there is no line of demarkation between the two courses. In Hassam the stone layer a is rolled and then grouted with cement, then a layer of grouting c is placed on the stone layer, and then pea stones are rolled into the grouting c. There is certainly no blending here of the courses a and c so that there is no line of demarkation between the two. On the other hand the line of demarkation is very pronounced, see Fig. 2, and therefore the Hassam pavement is no anticipation of applicant's. The McDonald pavement lacks both the specific lower course and specific upper course of

applicant's pavement, and from this it follows that when the McDonald Pavement is subjected to the initial pressure the upper *course* and lower course will not be blended together so that there is no line of demarkation as in applicant's pavement.

There being no anticipation of the advantageous invention defined by claim 2 the Examiner is also asked to resolve any doubt he may have as to the question of the patentability of that claim in applicant's favor and allow the same.

Respectfully submitted,

Edwin C. Wallace,

By Wm W Deane.

His Attorney.

Nov. 22 '09.

Div. 33 Room 164

ADDRESS ONLY

THE COMMISSIONER OF PATENTS,

WASHINGTON, D. C.

Paper No. 8

All communications respecting this application should give the serial number, date of filing, and title of invention.

W. G. W

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

Edwin C. Wallace

Mailed Dec. 14, 1909

c/o Wm. W. Deane,

" " "

800 H. St.,

Washington, D. C.

Division 33

Please find below a communication from the EX-AMINER in charge of your application, # 504,858; filed June 28, 1909; for Composite Pavements.

E. B. Moore,

Commissioner of Patents

This case has been examined in connection with ammendment of Nov. 22, 1909.

Claim 1 is rejected upon the references of record to McDonald or Warren for reasons of record. The patentable steps in applicant's process are disclosed in these references with the use of slightly different materials. The upper layer is spread upon the lower course and is worked into the same by rolling or compressing in the references, which is the essential *setp* in applicant's process. In using similar materials of different grades of fineness, from what the reference discloses, there is no patentable distinction whatever in so far as the process is concerned.

In line 11, of claim 2, the word "bonding" should be "bonded." Claim 2 otherwise may be allowed.

W. A. Cowles

Exr. Div. 33.

Serial No. 504858 Paper No. 9

APPLICATION ROOM

Amendment. D

DEC

20

1909

PATENT OFFICE

DEC 21 1909

U. S. PATENT OFFICE.

DIVISION 33,

Room 164:

In Application:

Edwin C. Wallace:

Composite Pavements:

Filed June 28, 1909:

Ser. No. 504,858:

C M R

Hon. Comr. of Patents,

Sir:—

In reply to the office letter of Dec. 14, 1909, this application is hereby amended as follows:

In line 11 of claim 2, change “bonding” to “bonded.”

In line 12 of claim 1, cancel “firmly bonding” and substitute “causing the bitumen and bituminous binding material to firmly bond.” Line 13, change “forming” to “form.”

ARGUMENT

In the last line of page 5 and lines 1-3, page 6 of the original specification it is stated that “the materials of the two courses being united at the top of the pavement in one integral or homogeneous mass that presents a smooth surface and one possessed of durable capacity.” This uniting of the two courses in one homogeneous mass at the top of the pavement is the result of the three steps set forth in claim 1, viz: the placing without compression of the mixture of stone and bitumen, the subsequent placing on the first mixture of the mixture of finely-divided mineral matter and bituminous binding material, and the initial com-

pression of the superposed courses. Moreover the attainment of the result desired depends not only on the steps set forth in proper sequence but on what may be termed the sub-steps of the first step, viz: the mixture of stone and bitumen, and the sub-steps of the second step, viz: the mixture of finely divided mineral matter and bituminous binding material, for without the bitumen in the one and the bituminous binding material in the other the third step of initially compressing the superposed courses would not bring about the bonding of the two layers into one and the formation of one compact rigid layer *denest* at the top. It is confidently thought that from the foregoing the Examiner will reach the conclusion that the materials of the two courses are essential to the practice of the process and the attainment of the result sought—to-wit the blending of the fine mixture with the coarse mixture at the top of the mass and the firm bonding of the two layers into one compact rigid layer *denest* at the top, and that, therefore, the claim patentability differentiates applicant's process from McDonald's mixture of ground bituminous stone spread upon a layer of stone or gravel and the whole rolled, and Warren's foundation layer of stone A upon which "is arranged the layer B of smaller stone, * * * coated with coal tar" which layer B "is thoroughly rolled into the foundation layer" before the heavy top layer of coarse particles and coal tar is applied and rolled. The Examiner will readily note that there is no suggestion in the said references considered together of the sequence of steps essential to

applicant's process and including the placing of the first course of stone and bitumen the placing of the second course of finely divided mineral matter on the first course before compression of the said first course, and the initial compression of the two courses "thereby causing the bitumen and bituminous binding material to firmly bond the two layers into one and form one compact rigid layer *denest* at the top."

For the reasons stated allowance of claim 1 and the application is solicited.

Respectfully submitted,

EDWIN C. WALLACE,

By Wm W Deane,

His Attorney.

Wash. D. C.

Dec. 20 '09.

Div. 33 Room 164

ADDRESS ONLY

THE COMMISSIONER OF PATENTS,

WASHINGTON, D. C.

Paper No. 10 (Rej.)

All communications respecting this application should give the serial number, date of filing, and title of invention.

E. C. Wallace

Care Wm. W. Deane,

Washington, D. C.

MAILED Jan. 27, 1910

" " "

DIVISION 33

Please find below a communication from the EXAMINER in charge of your application, 504,858, filed June 28, 1909, for "Composite Pavements."

E. B. Moore.

Commissioner of Patents.

Replying to amendment of Dec. 20, 1909.

Claim 1 is rejected upon the reference to McDonald, of record. In lines 50-60 of this reference the following steps are defined: The placing of the foundation layer of stone or gravel (this step is implied from the context), the laying on of a layer of ground bituminous binder of sufficient fineness on the layer of stone or gravel, in situ, and the rolling of the whole to form an integral compact paving mass. Accordingly it is obvious that each and every step of applicant's process is old. It is conceded that slightly different materials are used in the reference, such as uncoated stone instead of coated, and a ground filler or binding material instead of a material made by mixing mineral matter, which is presumably ground to a certain fineness, and a binder. In the reference a binder and mineral matter are combined before the grinding process; in applicant's process they are combined afterwards, which is regarded as immaterial. Moreover, it is held the ground material of the reference contains mineral matter as well as a binder. The specification undoubtedly verifies this and is the full and fair equivalent of the binding material superposed on the layer of stone in applicant's device. Whether the initial layer of stone be applied coated or uncoated is not material, in so far as the process is concerned. In uncoated stone wherein a filler or binder is applied and rolled, without doubt a bond is made between these elements. It is considered the bond would be as strong and would make as permanent a pavement as the bond between the coated stone

and the binder of applicant's pavement. Accordingly it is believed that the claim is fully and fairly met by the reference.

Claim 2 stands allowed.

W. A. Cowles

C M R

Examiner Div. 33

APPLICATION ROOM

FEB

504,858-11

5

Amdt. E

1910

U. S. PATENT OFFICE U. S. PATENT OFFICE,

Room 164:

FEB 7 1910

In Application:

E. C. Wallace:

DIVISION 33

Composite Pavements:

Filed June 28, 1909:

Ser. No. 504,858:

Hon. Comr. of Patents,

Sir:—

Replying to the office letter of Jan. 27, 1910, this application is hereby amended as follows:

Cancel claim 1, and substitute:

“1” The process of laying a pavement, which consists in placing upon a suitable foundation a course composed of large pieces of stone, smaller pieces of stone and stone dust, mixed with sufficient bitumen of proper consistency to thoroughly coat all of the particles, then placing on said first course, prior to compression thereof, a thin course composed of fine-divided

mineral matter mixed with sufficient bituminous binding material to thoroughly coat all of the particles and form a ~~non granular~~ ^{an agglutinated} mass and then initially compressing the two courses to form one by forcing the fine mixture and the coarse to blend into intimate relation at the top of the mass."

ARGUMENT

The applicant being a practical man in the pavement line and the action of Jan. 27, 1910 having been submitted to him, the Examiner's attention is particularly invited to his reasons why he believes the new claim 1 to be patentable over McDonald, as follows:—

As supplementary to the argument of the applicant, the Examiner is asked to again refer to the argument of counsel in the matter beginning with line 3 from the bottom of page 1 to line 13 page 2 in the amendment of Dec. 20 '09, when it is believed he will reach the conclusion that it is proper to characterize applicant's process both by steps and ingredients. See in this connection *Ex parte Painter* C. D. 1891-200

The clear novelty depended on to carry claim 1 is the placing on the lower course without any compression of said course of a thin course comprising finely-divided mineral matter mixed with binding material which coats the particles and forms a coherent mass as distinguished from a granular mass as in the reference cited, and then initially as for the first time compressing the two courses to form one by forcing

the fine mixture and coarse to blend into intimate relation at the top of the mass.

Applicant further wishes to emphasize the fact that while McDonald attempts to fill the voids to repletion throughout the mass he (applicant) does not attempt to fill the voids except in the upper portion of the mass—i. e., the part of the surface subjected to the abrasive action of traffic, but uses instead a lower
would

course which of itself \wedge under compression becomes rigid. It would not however if used alone be sealed to the action of the elements. The purpose of the finer upper course is not only to form additional bonding strength to the lower layer but by using a mixture sufficiently rich in bituminous content to form a coherent mass which when blended into close and intimate relation with a lower layer effectually seals it to the action of the elements. In addition to adding increased strength and durability to the pavement renders it unnecessary to paint the surface with bituminous composition technically known as "flush coat"; this latter not only being a source of trouble and annoyance but an increase in cost of construction and it frequently involves considerable additional expense of recovering the surface with stone screenings in order to take care of a surplus of bitumen which when the pavement is constructed under conditions not strictly ideal is almost impossible to avoid.

Attention is called to the fact that the binding material used by McDonald contains so little bitumen that it is practically a dry granular powder; otherwise

it would not "readily sift into the voids" as described by McDonald. So it is extremely doubtful if this material would have any effect as a binder except as a purely mechanical one for which purpose sand would answer as well unless the binding material was used

and if heated would not "readily sift into the voids." in a heated condition [^] Therefore the McDonald process would not under the conditions described give the results claimed by him. Further, owing to the heavy cost of transportation of the rock asphalt used by McDonald the field of usefulness is practically limited to the vicinity where such deposits are found and material of that nature which could be ground and used, without heating are very few even if the results claimed by McDonald could be obtained by his process. This is evidenced by the fact that in the construction of so-called asphalt streets where the use of natural rock asphalt or bituminous sand has been attempted it is not only necessary to carefully select the material but to use it in heated condition. Hence no real advantage accrues by the use of bituminous binding material by the McDonald process, whereas by my process there is not only great advantage but the use of such is absolutely essential to the process.

The Examiner stated in Office letter of Aug. 23 '09 that "It is regarded as not being a patentable change in omitting a step in the process etc. The rolling of the stone before the application of the second course or binder is applied certainly makes a much more solid mass and denser pavement than if the rolling were done after the application of the binder or second course."

This statement is true where the filling material or binder is of such nature that it would work into the small voids or interstices of compacted lower layer of wearing surface. Where granular material is used for this purpose it is absolutely essential that the lower layer be compacted. Otherwise under the motion imparted to the mass by the action of the roller (the usual means of compression) this granular material would work to the bottom and entirely defeat the purpose for which it was used. The same would hold true if a mobile liquid which could flow freely into very small interstices was used. It matters not whether the liquid possessed cementitious qualities of itself or was simply used as a vehicle to carry material which when deposited in these *vary* small interstices acted as bonding material. When, however, a bituminous composition containing sufficient bitumen to serve any useful purpose (that is to possess cementitious or bonding properties in the condition used) the statement is far from true and therein lies the novelty and utility of my process.

Bituminous compositions as used in the art are viscid substances possessing both adhesive and cohesive properties. When mixed with mineral matter it acts as an agglutinant and to this property its usefulness in the art is chiefly due. When therefore in constructing pavements such as described the compacting of the lower layer of wearing surface before the application of the upper layer would virtually destroy its usefulness. As owing to the cementitious properties of the bitumen, the mass of lower layer is coherent or

agglutinated and in this condition could not be forced into interstices or voids for the lower layer having already been subjected to pressure it is capable of withstanding a greater load or pressure without displacement of the particles than the material which is desired to be forced to penetrate or permeate the mass. So that following the line of least resistance this material not forced into the voids of the lower layer but is merely spread or plastered over the surface and does not blend with the lower layer. This blending is an essential feature—strengthening the wearing surface by blending fine layer with the coarse layer—thus producing one layer with no line of demarkation.

The McDonald patent is in the record and has been fully discussed pro and con, and therefore if in view of the foregoing presentation the Examiner is not convinced beyond the point of doubt, he is asked to follow the practice that obtains in the Office by resolving such doubt in applicant's favor, since applicant is confident of his ability to convince the courts in a practical way that the claim solicited sets forth patentable novelty.

Respectfully submitted,

Edwin C. Wallace

By Wm W Deane

His Attorney.

Feb. 4, 1910

APPLICATION ROOM

FEB

19

1910

Serial No. 504858 Paper No. 12
Amendment. F

U. S. PATENT OFFICE

AMENDMENT

Room 164:

In Application: U. S. PATENT OFFICE,

E. C. Wallace: FEB 21 1910

Composite Pavements: DIVISION 33.

Filed June 28, 1909:

Serial No. 504,858:

Hon. Commissioner of Patents,

Sir:—

Add the following claim:

3. A pavement consisting of a lower course per G composed of intermixed stone and cementitious medium per H \wedge initially laid on a suitable foundation F¹ without compression, and a thin upper course composed of a mixture of previously prepared per C finely divided mineral and bituminous matter desired

“ “ of ~~homogeneous~~ consistency superposed on the lower course after the latter has first been laid into intimate relation and thereafter blended \wedge with and bounded to the upper part of the lower course by pressure.

REMARKS

The foregoing claim is offered as supplemental to applicant's amendment of Feb. 5, 1910 and its consideration at the time action on said amendment is taken is requested.

Applicant now has in the case claim 1 for the process, allowed claim 2 for the pavement as an article, and

new claim 3, which is for the pavement as produced by the process.

It is believed that the arguments previously filed in the case fully set forth cogent reasons why the process claim should be allowed and those reasons are just as applicable to the allowance of new claim 3. At an interview with the Examiner it was understood, subject to the Examiner's approval, that a claim along the lines of present claim 3, viz. the pavement as produced by the process, would be favorably entertained, and such claim is therefore, with reason, offered.

It is desired to emphasize the fact that in applicant's pavement and process the lower course is formed by a mixture containing sufficient bitumen of such consistency that the latter acts
 medium
 per G as a cementitious \wedge ~~filler~~—something which the McDonald patent does not possess. In the McDonald patent, as will be seen from lines 49 et seq. the lower course is not provided with
 medium
 Per G the bituminous cementitious \wedge ~~filler~~ as in applicant's pavement and process, but on the contrary, an ordinary layer of stone or gravel forms the lower course, after which—as an upper course—the natural bituminous stone such
 bituminous or bitumen-bearing
 as \wedge sandstone or limestone, previously ground fine, is spread upon the previously laid and compacted
 \wedge lower layer of stone or gravel and then the

whole is rolled. This is not what applicant has devised either in process or pavement. In applicant's pavement and process, the first course is a mixture of the stone and the cementitious bitumen, and after that course has been laid, the upper course of thin finely divided mineral matter mixed with an agglutinating substance is applied and then the whole is rolled initially. In McDonald's pavement the upper course is simply of granular form—a dry granular powder, because if it were anything else, it could not sift “into the voids,” lines 52-53, McDonald patent. The action of such a granular filler is not to be confused with the action of the top course which applicant employs, which not only consists of finely divided mineral matter, but also sufficient bituminous binding material to form an agglutinated mass, and in addition to this, this upper course which so radically differs from the granular upper course employed by McDonald, is bonded and blended into a lower course which also is a different lower course from that employed by McDonald because said lower course not only has the pieces of sized stone employed by McDonald, but also smaller pieces of stone and bitumen.

We, therefore, believe that not only is the pavement itself a different one from McDonald's, but the process by which the payment is made involves radical novelty and the result is a new

one, the blending of the upper and lower courses, being very intimate, particularly in the upper part of the lower course, and so it is considered that process claim 1 and new claim 3 should both be favorably entertained.

Respectfully,
EDWIN C. WALLACE,
By Wm W Deane
His atty.

Feb. 19'10

APPLICATION ROOM.

FEB Serial No. 504858 Paper No. .13.
28 Amendment. G
1910

U. S. PATENT OFFICE U. S. PATENT OFFICE,
MAR 1 1910
DIVISION 33.

AMENDMENT

Room 164,

In Application:

E. C. Wallace:

Composite Pavements:

Filed June 28, 1909:

Serial No. 504,858:

Hon. Commissioner of Patents,

Sir:—

Claim 3, line 2, cancel “filler”[✓] and substitute:—
medium. Line 6, cancel “homogeneous” and sub-
stitute: desired. Line 8, after “blended” insert: into
intimate relation.

Page 2 of the amendment filed Feb. 19, 1910, amend as follows: line 10, cancel "filler" and substitute: medium. Line 14, cancel "filler" and substitute: medium. Line 17, before "sandstone" insert: bituminous or bitumen bearing, line 18, after "laid" insert:—, and compacted.

REMARKS

The foregoing amendments are offered to suitably correct applicant's supplemental amendment filed Feb. 19, 1910, and are to be considered as incorporated therewith in acting upon said amendment.

Respectfully,

Edwin C. Wallace,

Feb. 28 '10

By Wm W Deane
his atty.

DIV. 33 ROOM 164

ADDRESS ONLY

THE COMMISSIONER OF PATENTS

WASHINGTON, D. C.

Paper No. 14 (Rej)

All communications respecting this application should give the serial number, date of filing, and title of invention.

I A D

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,

WASHINGTON, D. C. Mar. 15, 1910

E. C. Wallace,

Care Wm. W. Deane,

Washington, D. C.

Please find below a communication from the EX-AMINER in charge of your application, 504,858, filed June 28, 1909, for "Composite Pavements."

E. B Moore.

Commissioner of Patents.

Replying to amendments of Feb. 15, Feb. 19, and Feb. 28, 1910.

New claims 1 and 3 have been carefully considered in connection with applicant's argument but no reason is found for receding from the stand already taken in regard to the patentable subject matter of these claims or of claims of like character.

The office takes issue with applicant's statement that the bituminous binder of McDonald is merely a sand, and has merely a mechanical action, being more of a filler than a binder. Even tho the binder of McDonald were in more or less granular form in the beginning, under the action of a heavy roller and on account of the heavy pressure superposed thereon and consequent friction between the parts, the heat generated will, in all probability, make the binder viscous, to a certain degree and it would consequently spread out like ordinary heated bitumen. If it were a sand and had only the function of sand, it would be useless to specify a bituminous stone as a binder. Ordinary sand would be as good and complete a filler as the bituminous stone and would be cheaper and more accessible.

Attention is called to the fact that McDonald intends this natural filler to have a holding, binding

function, as may be seen in lines 56-69, inclusive, of the specification. He states that the filler or binder has a holding power upon the fragments and under rolling, it becomes compact and hard, etc.

Because applicant asserts the bituminous binder of McDonald performs its function more or less imperfectly is not a matter to be passed upon and taken into consideration by the office.

The specification defines a bituminous binder rolled into a rough, stone course, to set up a binding action between the particles and form a monolithic mass, and the office must take it for granted that such result is attained. It is considered immaterial whether the first course of stone be coated or uncoated; both coated and uncoated stone as a first layer are common in road construction and the substitution of one for the other is purely a matter of choice.

Claims 1 and 3 are accordingly rejected upon the reference of record to McDonald.

Claim 2 stands allowed.

In view of the art, it is considered the novelty in this case is comprised in the claim allowed.

If applicant persists in claim 1 and 3 and claims of like character, it is desired that applicant take this action as final, since an issue has been reached.

W. A. Cowles

Examiner Div. 33.

C M R

APPLICATION ROOM

MAR 18 1910 Serial No. 504858 Paper No. 15
U. S. PATENT OFFICE Amendment. H
U. S. PATENT OFFICE

MAR 19 1910

DIVISION 33.

Room 164.

In Application.

E. C. Wallace.

Composite Pavement.

Filed June 28, 1909.

Ser. No. 504,858.

Hon. Comr. of Patents.

Sir:—

In reply to Office action of Mar. 15, 1910, this application is hereby amended as follows.

Cancel claims 1 and 3 and substitute:

“1—A pavement consisting of a lower course of large pieces of stone, smaller pieces of stone and stone dust mixed with sufficient bitumen of proper consistency to thoroughly coat all of the particles which is previously mixed and then laid, without compression, on a suitable foundation, and a previously mixed, upper course composed of finely divided mineral matter mixed with sufficient bituminous binding material to thoroughly coat all of the particles which is first spread in a thin layer on the lower course and thereafter blended and bonded with the lower course by compression, whereby the two courses are made a compact and substantially integral mass which is densest at its top.”

REMARKS.

— — — — —

In canceling applicant's claim 1 to the process this is done without intention of abandoning the subject-matter thereof and without prejudicing applicant's rights to claim said subject-matter in application Ser. No. 547,247, filed March 4, 1910.

In view of the oral interview had with the Examiner new claim 1 is submitted for favorable consideration.

Respectfully submitted,

Edwin C. Wallace.

By Wm W Deane

His atty.

Mar. 18, 1910.

2-254

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,
WASHINGTON, D. C.,

3-23....., 1910

In compliance with the provisions of the following order:

U. S. PATENT OFFICE,
MAR 24 1910
DIVISION 33.

(Order No. 1718.)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,

Washington, D. C., June 8, 1907.

It is hereby ordered that, except by formal amendment duly signed or as hereinafter provided, no cor-

rections, erasures, or interlineations be made in the body or written portions of the specification or of any other paper filed in an application for patent.

Obvious informalities in the wording of the specification may be corrected by the examiner, but said correction must be in the form of an amendment, approved by the Principal Examiner in writing, placed in the file, and made a part of the record. The changes specified in the amendment will be entered by the clerk in the regular way.

It is directed that no other changes be made by any person in any record of this office without the written approval of the Commissioner of Patents.

Attorneys, employees of the Patent Office, and all others will be held to strict accountability for any violation of this order.

E. B. Moore.

Commissioner.

The following changes are made in—

Application Serial No. 504858 of Edwin C. Wallace

In line 5 and 6 of page 6 before “process” and “surface” respectively insert the

W. A. Cowles

Examiner, Division 33

C M R

2—181.

ADDRESS ONLY

THE COMMISSIONER OF PATENTS,

WASHINGTON, D. C. Serial No. 504,858.

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE,

K O'D Washington, D. C., March 26, 1910.

Edwin C. Wallace,

c/o William W. Deane,

Washington, D. C.

Sir: Your APPLICATION for a patent for an IMPROVEMENT in Composite Pavements, filed June 28, 1909, has been examined and ALLOWED.

The final fee, TWENTY DOLLARS, must be paid not later than SIX MONTHS from the date of this present notice of allowance. If the final fee be not paid within that period the patent on this application will be withheld, unless renewed, with an additional fee of \$15, under the provisions of Section 4897, Revised Statutes.

The office delivers patents upon the day of their date, and on which their term begins to run. The printing, photolithographing, and engrossing of the several patent parts, preparatory to final signing and sealing, will require about four weeks, and such work will not be undertaken until after payment of the necessary fee.

When you send the final fee you will also send, DISTINCTLY AND PLAINLY WRITTEN, the

name of the INVENTOR and TITLE OF INVENTION AS ABOVE GIVEN, DATE OF ALLOWANCE (which is the date of this circular), DATE OF FILING, and, if assigned, the NAMES OF THE ASSIGNEES.

If you desire to have the patent issue to ASSIGNEES, an assignment containing a REQUEST to that effect, together with the FEE for recording the same, must be filed in this office on or before the date of payment of final fee.

After issue of the patent uncertified copies of the drawings and specifications may be purchased at the price of FIVE CENTS EACH. The money should accompany the order. Postage stamps will not be received.

Final fees will NOT be received from other than the applicant, his assignee or attorney, or a party in interest as shown by the records of the Patent Office.

Respectfully

E. B. Moore,
Commissioner of Patents.

IN REMITTING THE FINAL FEE GIVE THE SERIAL NUMBER AT THE HEAD OF THIS NOTICE.

UNCERTIFIED CHECKS WILL NOT BE ACCEPTED.

\$20 RECEIVED

2—327

MAY C

MEMORANDUM

5

1910

CHIEF CLERK, U. S. PATENT OFFICE
FEE PAID AT UNITED STATES PATENT
OFFICE.

(Be careful to give correct Serial No.)

Serial No. 504,858....1910 INVENTOR: Edwin
C. Wallace PATENT TO BE ISSUED TO Inventor
NAME OF INVENTION, AS ALLOWED: Com-
posite Pavement DATE OF PAYMENT: May 5, 1910
FEE: \$20—Final DATE OF FILING: June 28, 1909
DATE OF CIRCULAR OF ALLOWANCE: March
26, 1910.

The Commissioner of Patents will please apply the
accompanying fee as indicated above.

SEND PATENT TO

Wm W Deane

A. G. Du Bois,

Asso. Attorney

#800—H. Street, N. W. Washington, D. C.

2—191

Serial No. 504,858.

ISSUE DIVISION

All communications should be
addressed to "The Commissioner of
Patents, Washington, D. C."

DEPARTMENT OF THE INTERIOR

J. H. UNITED STATES PATENT OFFICE,

WASHINGTON, D. C. May 5, 1910.

Edwin C. Wallace,

c/o Wm. W. Deane,

800 H St.,

Washington, D. C.

PATENT WILL ISSUE

May 31

1910

Sir:

You are informed that the final fee of TWENTY

DOLLARS has been received in your application for
Improvement in Composite Pavements

Date of receipt May 5, 1910

Very respectfully,

E. B. Moore

Commissioner of Patents.

2—421

1909

CONTENTS:

94, PAVING
Concrete.

Print

1. Application 1 papers. O K
2. Rejection, Aug—23, 1909
3. Amendment, A Sept. 15 "
4. Rejection Oct 8 "
5. Amendment B " 25 "
6. Rejection Nov. 11 "
7. Amendment C " 22 "
8. Rejection Dec 14 "
9. Amendment D " 20 "
10. Rejection Jan 27, 1910
11. Amendt E Feb. 5 — 1910
12. " F. " 19 "
13. " G. " 28 "
14. Rejection. Mar. 15 "
15. Amendment H " 18 "
16. Ex Amend Mar 23— "
- 17.
- 18.

19.
20.

TITLE:
Composite Pavement
2—Claims

[Endorsed]:

No. F-1-Eq Warren Bros Co. vs. Thompson Plffs
EXHIBIT No. 6 Filed Nov 8 1921 CHAS. N. WIL-
LIAMS, Clerk By W U Handy Deputy Clerk.

U. S. PATENT OFFICE, COPY MADE JUL 25
1910

Copies to G.C.W.; J.M.H.; W.E.H.
926 California Bldg.,
Los Angeles, California
November 9, 1920.

Thompson Bros.:

Claude M. Thompson,
Eugene O. Thompson,
O. M. Thompson.

Fresno, California.

Gentlemen:-

You are hereby notified that construction according
to Fresno County specifications, asphalt wearing sur-
face, type A, will infringe our U. S. Letters Patent
No. 959,976, issued May 31, 1910.

We are also advising the Board of Supervisors of
Fresno County, with whom you entered into a contract,
dated November 5, 1920, for work to be done under
the above specifications, of the facts above stated.

Yours very truly,

WARREN BROTHERS COMPANY,
By W E Hacker
California Manager

Nov. 10, 1920. 4 p.m.

I hereby certify that I have this date mailed by registered mail the original of the present ^{letter} ~~enclosure~~ to Thompson Brothers, Fresno, California.

Lee Shirar

Copies to G.C.W.; J.M.H.; W.E.H.

926 California Bldg.,
Los Angeles, California
November 9, 1920.

Mr. J. B. Hill,
c/o J. B. Hill & Company,
H Street,
Fresno. California

Dear Sir:-

You are hereby notified that construction according to Fresno County specifications, asphalt wearing surface, type A, will infringe our U. S. Letters Patent No. 959,976, issued May 31, 1910.

We are also so advising the Board of Supervisors of Fresno County, and Thompson Bros., who have entered into a contract, of date of November 5, 1920, for the performance of work under the above specifications, and in connection with which contract bonds for faithful performance and for the security of materialmen, laborers, and others, were given, upon which bonds you and Mr. H. E. Vogel are sureties.

Yours very truly,

WARREN BROTHERS COMPANY,

By W E Hacker

California Manager

Nov. 10, 1920. 4 p.m.

I hereby certify that I have this date mailed by registered mail the original of the present ~~enclosure~~ letter to Mr. J. B. Hill, c/o J. B. Hill & Company, H Street, Fresno, California.

· Lee Shirar

Copies to G.C.W.; J.M.H.; W.E.H.

926 California Bldg.,
Los Angeles, California
November 9, 1920.

Mr. H. E. Vogel,
Rural Route K,
Fresno, California

Dear Sir:-

You are hereby notified that construction according to Fresno County specifications, asphalt wearing surface, type A, will infringe our U. S. Letters Patent No. 959,976, issued May 31, 1910.

We are also so advising the Board of Supervisors of Fresno County, and Thompson Bros., who have entered into a contract, of date of November 5, 1920, for the performance of work under the above specifications, and in connection with which contract bonds for faithful performance and for the security of materialmen, laborers, and others, were given, upon which bonds you and Mr. J. B. Hill are sureties.

Yours very truly,

WARREN BROTHERS COMPANY,

By W E Hacker

California Manager

Nov. 10, 1920. 4 p.m.

I hereby certify that I have this date mailed by registered mail the original of the present ^{letter} ~~enclosure~~ to Mr.

H. E. Vogel, Rural Route K, Fresno, California.

Lee Shirar

Copies to G.C.W.; J.M.H.; W.E.H.

926 California Bldg.,
Los Angeles, California
November 9, 1920.

To the Honorable Board of Supervisors
of Fresno County,
Fresno, California.

Gentlemen:-

You are hereby notified that construction according to Fresno County specifications, asphalt wearing surface, type A, will infringe our U. S. Letters Patent No. 959,976, issued May 31, 1910.

We are also advising Thompson Bros., contractors, with whom you entered into a contract of date of November 5, 1920, for the performance of work under the above specifications, of the facts above stated.

Yours very truly,

WARREN BROTHERS COMPANY,

By W E Hacker

California Manager

Nov. 10, 1920. 4 p.m.

I hereby certify that I have this date mailed by registered mail the original of the present ^{letter} ~~enclosure~~ to The

Honorable Board of Supervisors of Fresno County,
Fresno, California.

Lee Shirar

[Endorsed]: No. F-1-Eq Warren Bros Co vs. Thompson Plffs EXHIBIT No. 7 Filed Nov 8 1921
CHAS. N. WILLIAMS, Clerk BY W U. Handy
Deputy Clerk

	1910	1912	To 8-31 1921	Total
Alabama			121,760	486,775
Arizona			161,988	707,698
Arkansas			275,981	518,362
California			676,057	3,506,440
Colorado			93,018	93,018
Connecticut				1,243,786
Georgia				100,913
Idaho			168,944	168,944
Iowa			83,546	731,693
Kansas			5,840	32,217
Kentucky				51,571
Louisiana			58,862	489,268
Massachusetts	874	28,701	274,573	1,186,541
Michigan				30,832
Minnesota			160,285	411,045
Missouri			110,027	317,291
Montana			5,957	17,251
Nebraska				195,186
New Hampshire				78,989
New Jersey			277,669	1,006,524
New Mexico			32,014	133,329
Nevada				65,222
New York			133,901	915,941
No. Carolina			308,115	640,264
No. Dakota			79,901	329,619
Ohio			41,215	312,890
Oklahoma				177,237
Oregon			116,229	307,662
Pennsylvania				12,405
Rhode Island			308	87,860
South Carolina				

S T A T E M E N T

Showing total yardage of pavement laid under
License of Patents owned by Warren Bros. Company
1910 to Aug. 31, 1921 inclusive.

Column 1 - Year Laid

“ 2 - Yardage laid in accordance with F.J.W.
Patent 727505
“ 3 - “ “ “ “ “ E.C.W.
“ 959976

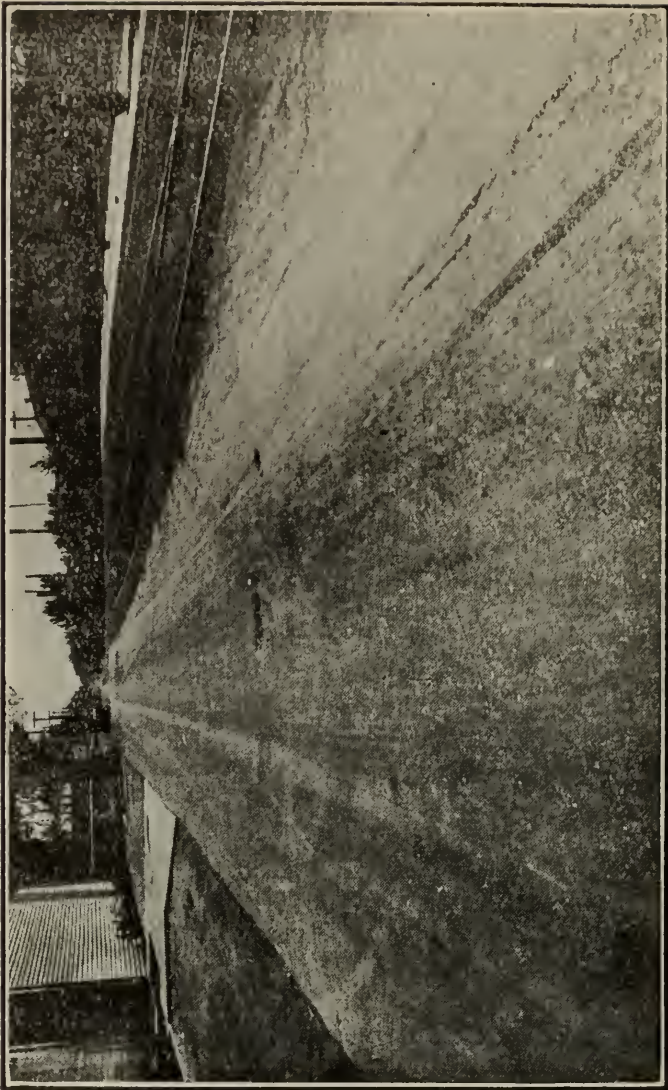
“ 4 - Total both kinds

“ 5 - Percentage which yardage laid under
E. C. W. Patent 959976 bears to total yardage.

1	2	3	4	5
1910	3,046,402	874	3,047,276	0.3
1912	4,801,900	28,701	4,830,601	0.6
1913	5,064,818	16,250	5,081,068	0.3
1914	4,122,646	82,297	4,204,943	1.9
1915	4,196,968	298,425	4,495,393	6.6
1916	4,700,109	819,656	5,519,765	14.8
1917	3,689,403	1,529,770	5,219,173	29.3
1918	3,267,087	1,532,696	4,799,783	31.9
1919	4,446,035	3,021,296	7,467,331	40.4
1920	5,017,512	6,242,135	11,259,647	55.2
1921	937,628	4,436,502	5,374,130	82.5

Totals 43,290,508 18,008,602 61,299,110 29.0

[Endorsed]: No. F-1-Eq Warren Bros Co vs.
Thompson Plffs EXHIBIT No. 8 Filed Nov. 8 1921
CHAS. N. WILLIAMS, Clerk BY W U. Handy
Deputy Clerk



Blackstone Ave, Fresno California Photograph taken by G H Perkins Oct. 30 1921 Photograph shows the southern end of the pavement laid by Thompson Brothers January 7th and 8th 1921 for the County of Fresno, under Type A Specifications. This work being part of Route 5, Section A—

Note—the ruts caused by traffic—

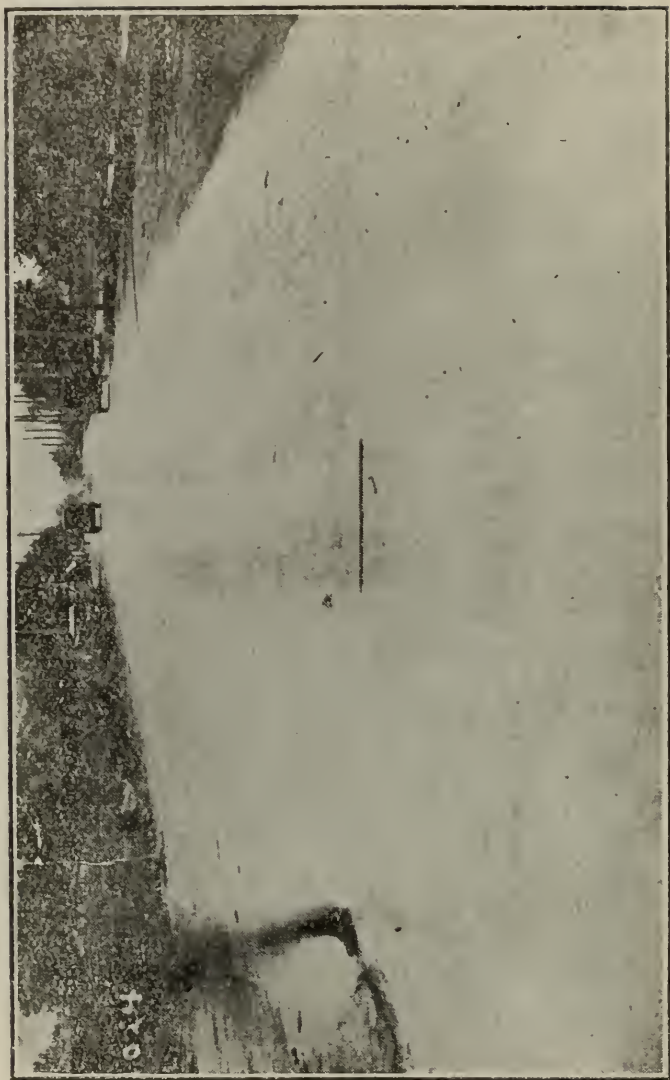
No. F-1-Eq Warren Bros vs Thompson Plffs
EXHIBIT No. 9 CHAS. N. WILLIAMS, Clerk By
W. U. Handy Deputy Clerk



L-068

Enlarged Photo of sample from Blackstone Ave on East Side, 287, 3 ft north of South County Line Pavement laid by Thompson Bros—under Type A specifications Pavement laid January 7 1921 Sample cut January 8 1921 #20

E No. F-1-Eq Warren Bros vs Thompson Plffs
EXHIBIT No. 20 Filed Nov. 9 1921 CHAS. N.
WILLIAMS, Clerk By W U Handy Deputy Clerk



Blackstone Ave, Fresno California Photograph taken by J S Burdge Oct 30 1921 Looking South toward City of Fresno from Hedges Ave. (a) The foreground to the 2 ft rule (lying crosswise of the road) was laid under Type "B" Specifications under license of Wallace Patent 959976 (b) The background be-

yond the rule, and to right of the joint in center of the roadway is Warrenite Bitulithic laid for the City of Fresno, under license of Wallace patent 959976 (c) The background beyond the rule and to left of the joint in center of the roadway is Part of Route 5 Section A laid by Thompson Bros for County of Fresno under Type A Specifications. #21

No F-1-Eq Warren Bros v Thompson Plffs EXHIBIT No. 21 Filed Nov. 9 1921 CHAS. N. WILLIAMS, Clerk By W U. Handy Deputy Clerk

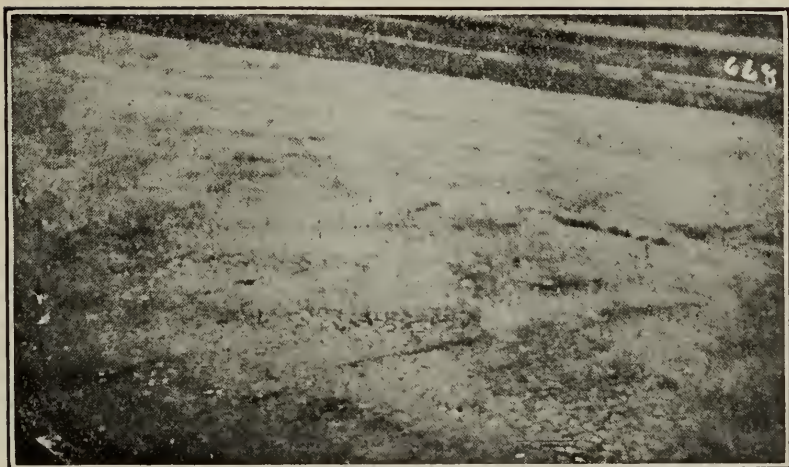


No. F-1-Eq Warren Bros vs. Thompson Plff EXHIBIT No. 22 Filed Nov. 9, 1921 CHAS. N. WILLIAMS, Clerk By W. U. Handy, Deputy Clerk Fresno, Co. Calif Jan 7" 1921 Blackstone Ave. part of Route 5, Sec. A Fresno Co. Highways showing Binder Type A after being rolled with 10 ton roller #22



Fresno Co. Calif. Jan. 8" 1921 Blackstone Ave. part of Route 5, Sec. A, Fresno Co. Highways. Near Hedges Ave. Finishing Course (Type A) after being rolled showing bright spots where stones in the Binder Course are just barely covered. #23

No. F-1-Eq Warren Bros vs Thompson Plffs EXHIBIT No 23 Filed Nov 9 1921 CHAS. N. WILIAMS, Clerk By W. U. Handy Deputy Clerk



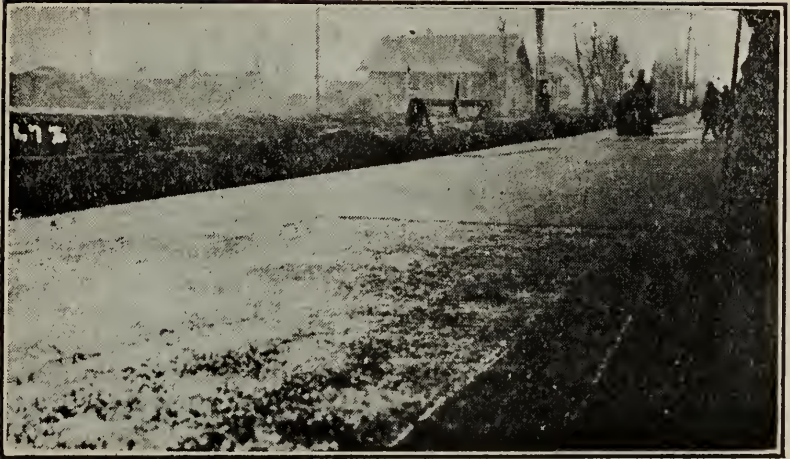
Fresno Co. Calif Jan 7" 1921 Blackstone Ave. part
of Route 5, Sect. A. Fresno Co. Highways. Finish-
ing course rolled showing stone in Binder (Type A.)
#24

No. F-1-Eq Warren Bros vs Thompson Plffs EX-
HIBIT No 24 Filed Nov. 9, 1921 CHAS. N. WIL-
LIAMS, Clerk By W. U. Handy Deputy Clerk

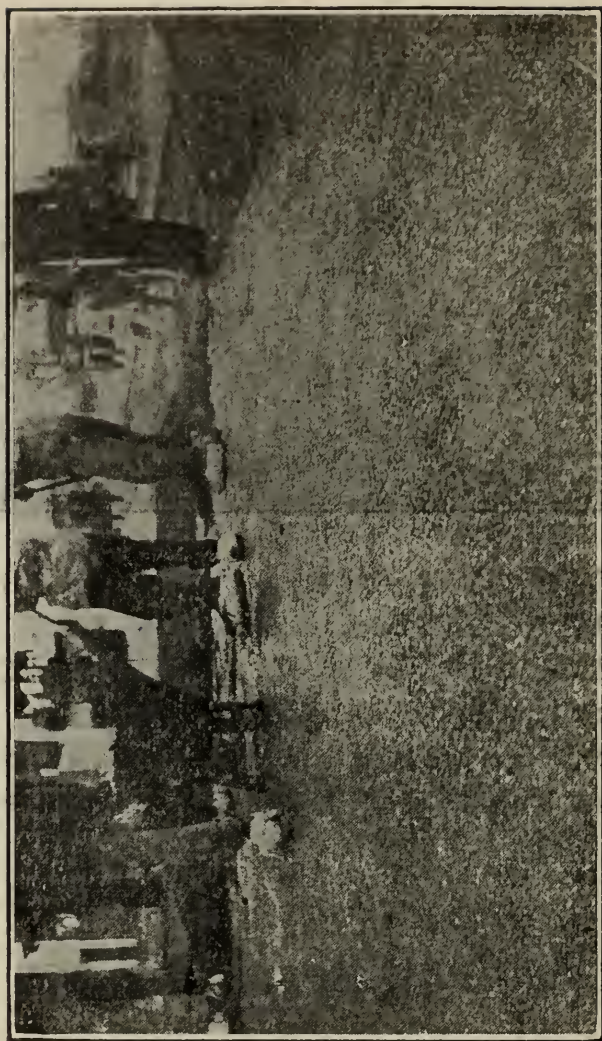


Fresno Co. Calif. Jan 8" 1921 Blackstone Ave. at Hedges Ave. at Hedges Ave. part of Route 5, Sec A, of Fresno County, Highways showing finishing course rolled. (Type A) #25

No. F-1-Eq. Warren Bros vs. Thompson Plffs
EXHIBIT No. 25 Filed Nov 9 1921 CHAS. N.
WILLIAMS, Clerk By W. U. Handy Deputy Clerk

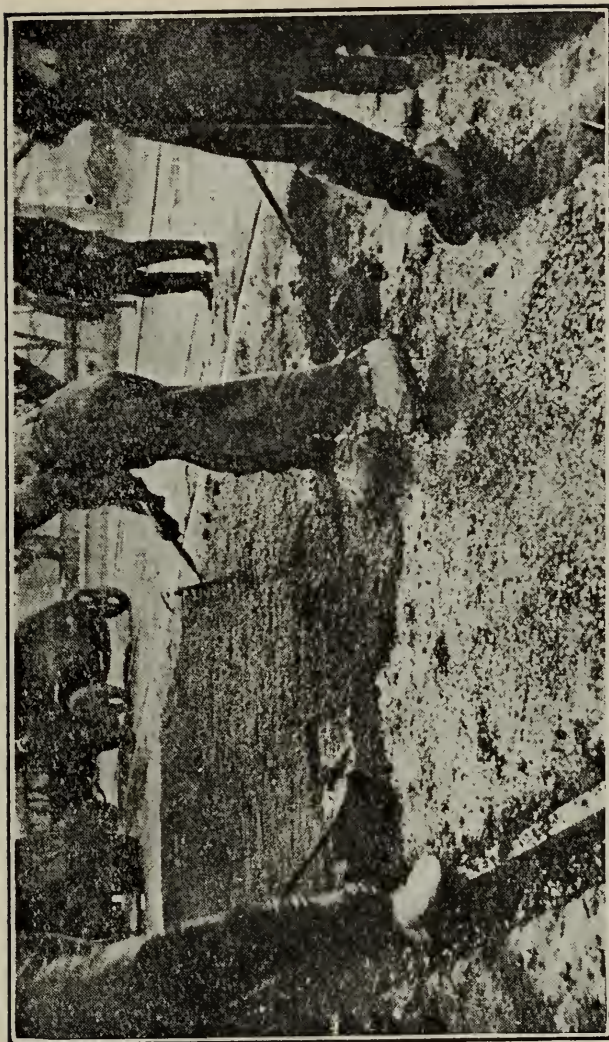


No. F-1-Eq Warren Bros vs. Thompson Plffs
EXHIBIT No. 26 Filed Nov 9 1921 CHAS. N.
WILLIAMS, Clerk By W. U. Handy Deputy Clerk
Fresno Co. Calif Jan 8" 1921 Blackstone Ave. part
of Route 5, Sec. A, Fresno Co. Highways. Looking
South near Hedges Ave. Showing Binder Surfacing
Courses (Type A.) after rolling. #26



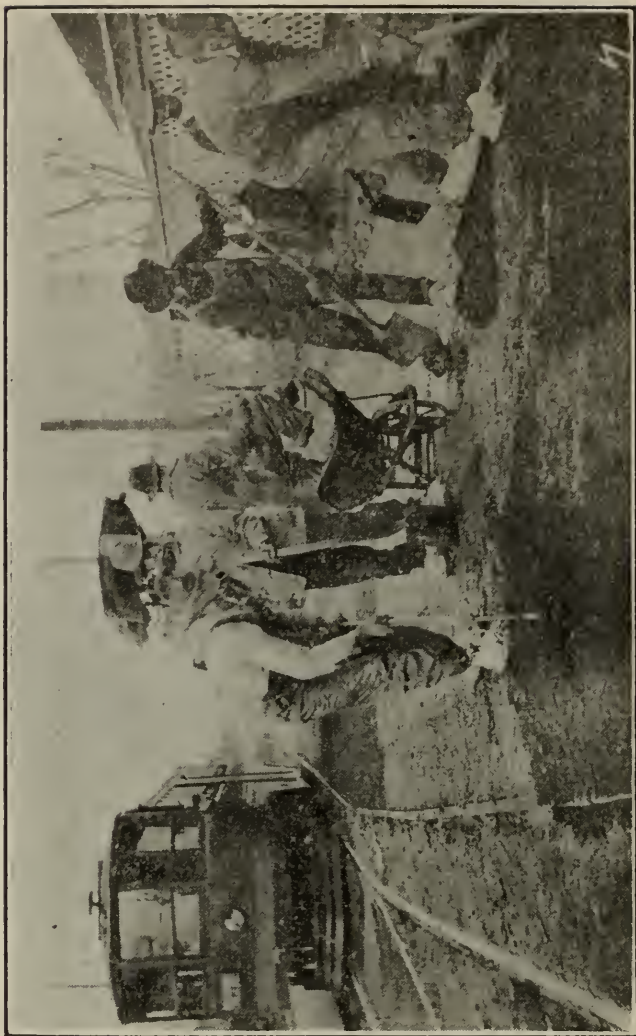
Fresno. Co. Calif 1/7/21 4 P. M. County work being laid on Blackstone Ave (Part of Route 5 Sec. A) by Thompson Bros. Co Looking south. Showing voids in coarse mix after rolling at time fine mix applies "Type A" # 36 B

No. F-1-Eq Warren Bros vs. Thompson Plffs
EXHIBIT No. 36 Filed Nov. 9 1921 CHAS. N.
WILLIAMS, Clerk By W U. Handy Deputy Clerk



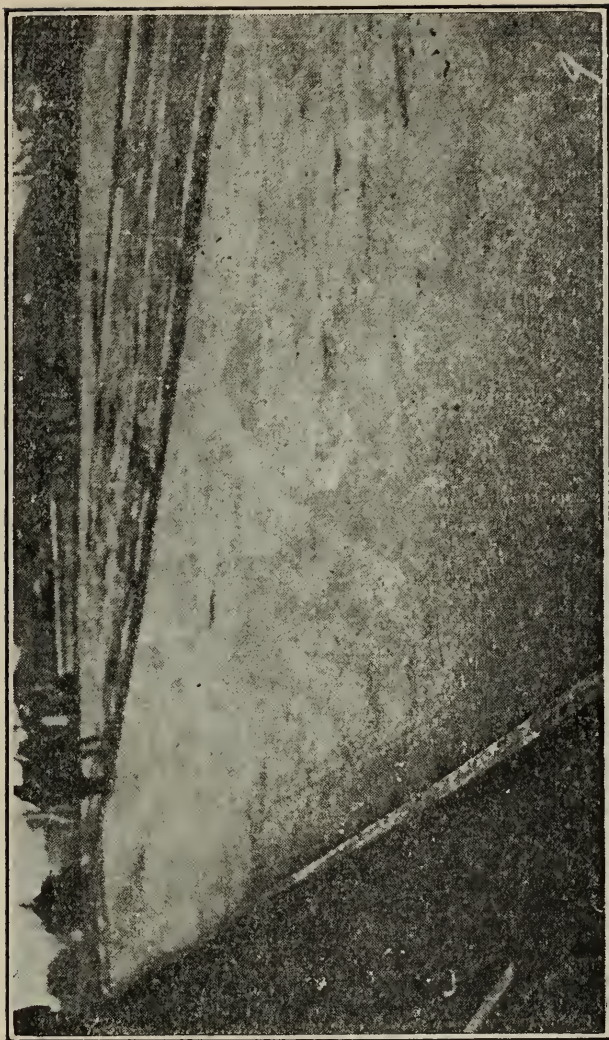
Fresno Co. Calif 1/7/21 2/15 P. M. Showing County work. Looking S near bridge at county line. Placing 'fine on coarse mix after rolling coarse mix $1\frac{1}{2}$ " surface on $3\frac{1}{2}$ " A C base Part of Route 5 Sec. A. (Blackstone Ave) B "Type A" #37

No. F-1-Eq. Warren Bros vs Thompson 'Plffs
EXHIBIT No. 37 Filed Nov 9 1921 CHAS. N.
WILLIAMS, Clerk By W. U. Handy Deputy Clerk



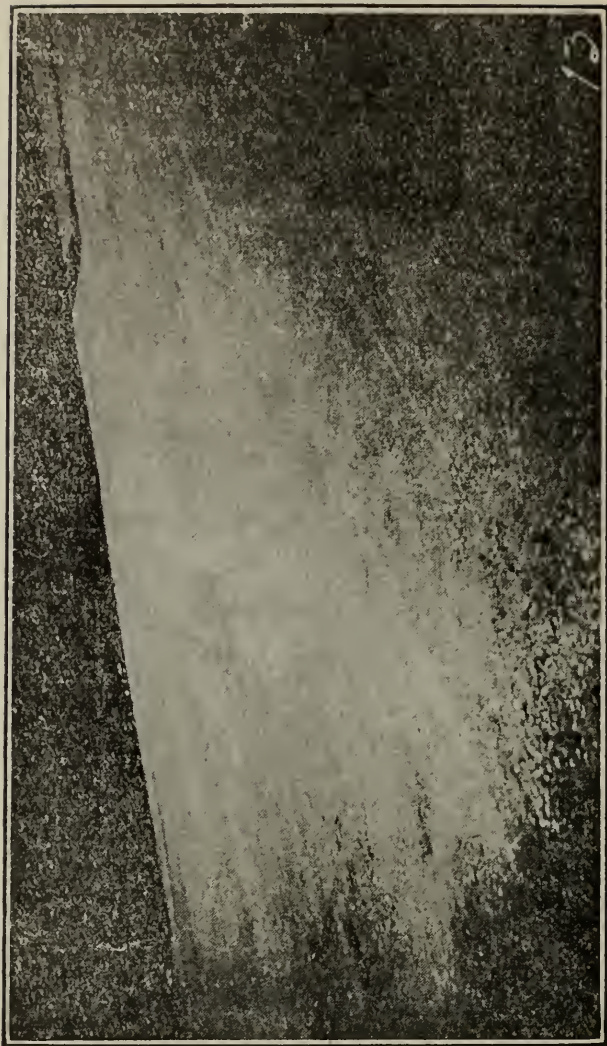
Fresno Co. Calif 1/7/21 2/30 P. M. Showing County work on part of Route 5 Sec. A (Blackstone Ave.) Looking N. from near bridge at S. end of work. 10 ton roller on coarse mix and men spreading fine mix on the coarse that has been rolled. $1\frac{1}{2}$ " surface on $3\frac{1}{2}$ " A. C. base "Type A" #38 B

No. F-1-Eq Warren Bros vs. Thompson No. 38 Filed Nov 9 1921 Pliffs EXHIBIT CHAS. N. WILLIAMS, Clerk By W U. Handy Deputy Clerk



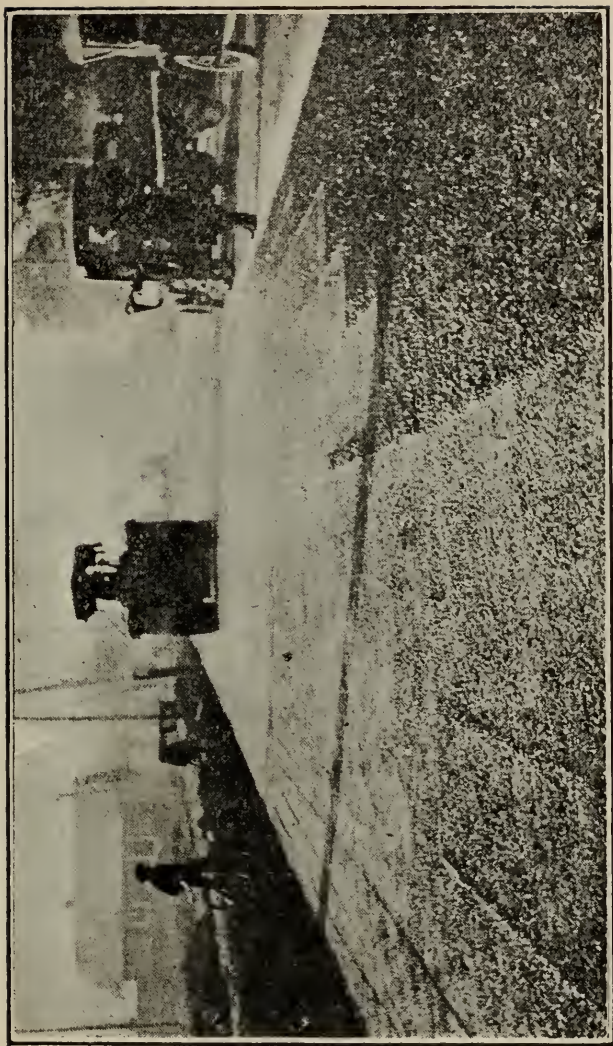
Fresno Co. Calif 1/7/21 3/15 P. M. 'County work on part of Route 5, Section A. (Blackstone Ave) Looking S. toward bridge at S. end of work showing spotted appearance of 'finished work where rock lays close to the surface. "Type A." #39

No. F-1-Eq Warren Bros vs. Thompson Plffs
EXHIBIT No. 39 Filed Nov 9 1921 CHAS. N.
WILLIAMS, Clerk By W. U. Handy Deputy Clerk



Fresno Co. Calif 1/8/21 — A. M. Looking S. E. on County work on part of Route 5 Sec A.—Photo shows finished pavement. All rocks nearest surface easily located by shiny spotted appearance as shown in picture. "Type A." #40

No F-1-Eq Warren Bros v Thompson Plffs EXHIBIT No. 40 Filed Nov 9 1921 CHAS. N. WILLIAMS, Clerk By W U. Handy Deputy Clerk



Fresno Co. Calif 1/8/21 A. M. Looking S. on county work on part of Route 5 Sec A. (Blackstone Ave) showing 10 ton roller at work on finished surface & Coarse mix—Note voids in coarse mix. Also some unrolled coarse mix. "Type A" #41

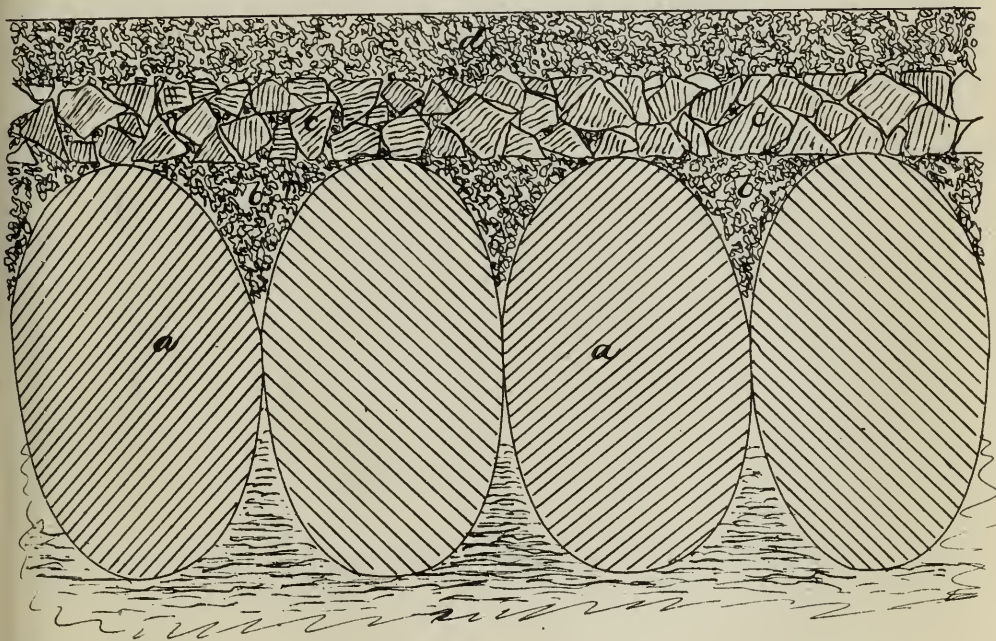
No. F-1-Eq Warren Bros vs. Thompson Plffs
EXHIBIT No. 41 Filed Nov 9 1921 CHAS. N.
WILLIAMS, Clerk By W. U. Handy Deputy Clerk

J. P. Cranford.

Composition Pavement.

No 88,139.


Patented Mar. 23, 1869.



Witnesses;
Chas. A. Smith

Geo. D. Waelder

Inventor;
John P. Cranford



United States Patent Office.

JOHN P. CRANFORD, OF BROOKLYN, NEW YORK.

Letters Patent No. 88,139, dated March 23, 1869.

IMPROVED COMPOSITION-PAVEMENT.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern :

Be it known that I, JOHN P. CRANFORD, of Brooklyn, in the county of Kings, and State of New York, have invented and made a new and useful Improvement in Composition-Pavements; and I do hereby declare the following to be a full, clear, and exact description of the said invention, and of the features distinguishing the same from other composition-pavements.

In forming pavements of sand, gravel, broken stone, tar, and similar material, it is usual to remove the old round, or cobble-stone pavement, and excavate to the desired depth, and then form the roadway with layers of such materials, and roll them, for causing the mass to consolidate properly. In doing this, considerable expense is involved in removing the stones of the pavement, and in supplying sufficient thickness of composition-pavement for the required strength.

The nature of my said invention consists in a method of preparing the foundation and laying the composition-pavement, so as to avail of the stones already laid in the street, and put upon them a surface that makes a smooth roadway, and one that is water-proof, so that the frost will not injure the same.

I first prepare the cobble or other stones that may be laid in the streets, by driving them down moderately even by a heavy roller, or by rammers, and, if necessary, reset any loose or misplaced stones. I then remove the earth, or dirt from between the stones, and clean the upper surface of the stones by brushing or scraping, and when the exposed surfaces of the stones are dry, I apply tar, or similar bituminous material, in a melted, or liquid state, by pouring the same upon the stones.

In the drawing annexed, the improvement is illustrated by a vertical section, *a a*, representing the cobble-stones as prepared in the aforesaid manner.

I next apply a composition, formed of sand, ashes, gravel, or similar material, rendered plastic by the admixture of sufficient tar, or other bituminous material. This is rammed, or otherwise forced into the interstices of the stones, so as to adhere to them. This layer is shown at *b*.

A second layer is applied to form a body for the composition-pavement. This is composed of gravel or broken stone, mixed with sand, or gravel and ashes, or similar materials, rendered sufficiently plastic or adhesive, by tar, or bituminous material, to cause the mass to consolidate firmly when exposed to a heavy pressure, by rolling, or otherwise. This also more fully consolidates the first layer, *b*, and causes its adhesion to the stones. This layer is represented at *c*.

A top layer, *d*, is applied for making a smooth and somewhat elastic surface. It is composed of finer materials than the layer *c*, such as gravel, sand, ashes, and tar, or bituminous material, and it is to be rolled even and solid.

A pavement formed in the manner specified, is very durable, and can be laid at much less cost than those before constructed of stone, gravel, &c., and bituminous material, because it does not require to be so thick. Water being excluded from the foundation, there can be no injury from frost.

What I claim, and desire to secure by Letters Patent, is—

The composition-pavement, formed of layers, applied to and combined with a stone pavement, in substantially the manner specified.

In witness whereof, I have hereunto set my signature, this 18th day of February, 1869.

JOHN P. CRANFORD.

Witnesses:

CHAS. H. SMITH,
GEO. T. PINCKNEY.

Attest:
Twin T. Jewell
Chas. Helm.

By *his* Attorney
Edward J. De Smedt.
I. W. Sinsabaugh.

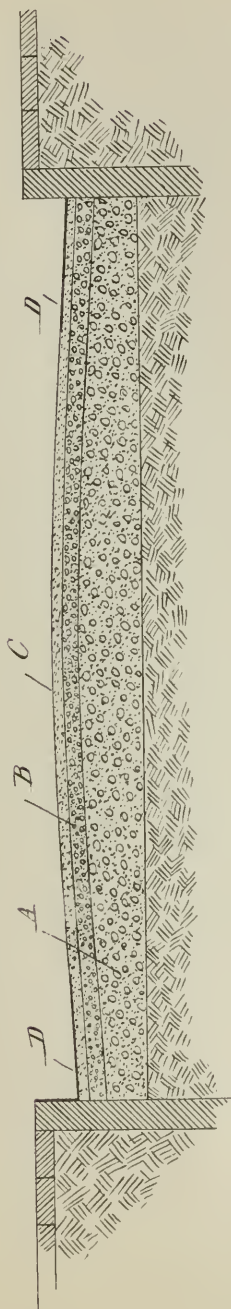


No Model.)

E. J. DE SMEDT.
ARTIFICIAL PAVEMENT.

No. 375,273.

Patented Dec. 20, 1887.



Witnesses
Edwin D. Jewell
Chas Helm.

Inventor
Edward J. De Smedt.
By his Attorney
L. W. Sinsabaugh.

UNITED STATES PATENT OFFICE.

EDWARD J. DE SMEDT, OF WASHINGTON, DISTRICT OF COLUMBIA.

ARTIFICIAL PAVEMENT.

SPECIFICATION forming part of Letters Patent No. 375,273, dated December 20, 1897.

Application filed January 35, 1897. Serial No. 225,481. (No model.)

To all whom it may concern:

Be it known that I, EDWARD J. DE SMEDT, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Concrete Pavements, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to certain improvements in concrete pavements.

The object of my invention is to thoroughly lock or cement the different layers or strata of which the pavement is composed, more especially to form a bond of union between the upper or wearing course and the intermediate or binding course, so that there will be less liability to crack and disintegrate under the influences of heat, cold, or moisture.

In the drawing I have shown a transverse sectional view of a pavement laid according to my invention.

In carrying out my invention the road-bed is graded to the proper depth, upon which is placed a layer of cement concrete, A, said concrete being made of Portland or other good hydraulic cement, clean sharp sand, and broken stone, brick, or gravel, and laid to the depth of three or more inches, the thickness of this layer being dependent on the probable traffic of the road or street to be paved. The proportions of ingredients used in this concrete base may be varied; but I prefer to use them in the following proportions: One measure of hydraulic cement and two measures of clean sharp sand, free from clay or other extraneous matter, is mixed with a suitable amount of water to form a mortar. Broken stone, or hard broken brick or gravel of the proper size, either separate or combined, is soaked or saturated with water, and while in this saturated condition is mixed with the mortar above described, the quantity of broken stone being such as will give a surplus of mortar when the concrete is runned down on the road-bed.

pared road-bed and thoroughly compacted by ramming until the free mortar appears upon the surface. The upper surface of this layer or bed of concrete is finished with a smooth surface and so shaped as to correspond to the curvature of the crown or upper surface of the pavement. When this foundation layer or course of hydraulic concrete has set or become sufficiently hard, I place thereon the cementing or locking course B, which is composed of the following materials: Broken stone about one inch in largest diameter is thoroughly screened in order to free it from dust, is heated by passing the same through revolving heaters, and while in this heated condition is mixed, by means of machinery or otherwise, with the residuum of coal-tar-distillate, which is known in the trade as "No. 4," or any other number, or with coal-tar products and asphaltum and petroleum-oil combined, until each stone is perfectly and evenly coated with the bituminous matter, care being exercised in order to avoid a surplus of the bituminous material. About one-half gallon of the coal-tar product is used for each cubic foot of broken stone, this amount being sufficient to firmly bind the broken stone together without having a surplus of the bituminous material to run down and fill the voids between the broken stone.

Instead of using broken stone, I may use gravel and sand mixed together, or a combination of broken stone, gravel, and sand, when the same is coated with the bituminous compound. A layer of suitable thickness of the broken stone thus prepared is laid on the hydraulic concrete base A and rolled or compacted in any suitable manner, so as to form a substantial bed for the top or wearing course, C.

The top or wearing course, C, is composed of refined Trinidad or other suitable asphaltum, heavy petroleum, or the residuum of petroleum, fine sand, and powdered carbonate of lime, mineral dust, or any other finely-divided mineral material.

The proportions of the above-mentioned substances will depend upon the character and the traffic of the street, and in some cases the

WITNESSES:

J. M. Dalton
Saul S. S. S. S.

INVENTOR

Edward J. De Smedt

BY

Charles F. Johnson
ATTORNEYS

In carrying out my invention the road-bed is graded to the proper depth, upon which is placed a layer of cement concrete, A, said concrete being made of Portland or other good hydraulic cement, clean sharp sand, and broken stone, brick, or gravel, and laid to the depth of three or more inches, the thickness of this layer being dependent on the probable traffic of the road or street to be paved. The proportions of ingredients used in this concrete base may be varied; but I prefer to use them in the following proportions: One measure of hydraulic cement and two measures of clean sharp sand, free from clay or other extraneous matter, is mixed with a suitable amount of water to form a mortar. Broken stone, or hard broken brick or gravel of the proper size, either separate or combined, is soaked or saturated with water, and while in this saturated condition is mixed with the mortar above described, the quantity of broken stone being such as will give a surplus of mortar when the concrete is rammed down on the road-bed.

The mixing of the broken stone with the mortar may be done by hand or with suitable machinery, such mixing being carried on until each piece of broken stone or other material used is completely coated or covered with the mortar. The cement concrete thus formed is then spread at once on the previously-pre-

matter, care being exercised in order to avoid a surplus of the bituminous material. About one-half gallon of the coal-tar product is used for each cubic foot of broken stone, this amount being sufficient to firmly bind the broken stone together without having a surplus of the bituminous material to run down and fill the voids between the broken stone.

Instead of using broken stone, I may use gravel and sand mixed together, or a combination of broken stone, gravel, and sand, when the same is coated with the bituminous compound. A layer of suitable thickness of the broken stone thus prepared is laid on the hydraulic concrete base A and rolled or compacted in any suitable manner, so as to form a substantial bed for the top or wearing course, C.

The top or wearing course, C, is composed of refined Trinidad or other suitable asphaltum, heavy petroleum, or the residuum of petroleum, fine sand, and powdered carbonate of lime, mineral dust, or any other finely-divided mineral material.

The proportions of the above-mentioned substances will depend upon the character and the traffic of the street, and in some cases the carbonate of lime or mineral dust may be omitted. This will depend on the quality of the sand.

In order to protect the sides of the pave-

1903c
UNITED STATES PATENT OFFICE.

F. J. WARREN.
PAVEMENT.

APPLICATION FILED MAY 16, 1901.

AMZI L. BARBER, OF WASHINGTON, DISTRICT OF COLUMBIA.

CONCRETE PAVEMENT.

SPECIFICATION forming part of Letters Patent No. 391,222, dated October 16, 1898.

Application filed July 13, 1898. Serial No. 280,323. (No specimens.)

To all whom it may concern:

Be it known that I, AMZI L. BARBER, a citizen of the United States of America, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Concrete Pavements, of which the following is a specification.

My invention relates to improvements in concrete pavements, and more particularly is an improvement on the invention of E. J. De Smedt, patented December 20, 1887, No. 375,273.

The object of my invention is to thoroughly lock or cement the different layers or strata of which the pavement is composed, so that there will be less liability to crack and disintegrate under the influence of the heat, cold, or moisture.

My invention consists, therefore, of a pavement having a base or foundation layer of broken stone or gravel coated with a coal-tar paving-cement, upon which is placed a second and intermediate layer of smaller broken stone coated with coal-tar, upon which is placed the wearing course or layer of asphaltum, heavy petroleum, or the residuum of petroleum, and fine sand.

In carrying out my invention the road-bed is excavated to the proper depth, preferably about six inches below the surface of the pavement when completed, upon which is laid a foundation-layer of coarse broken stone or gravel about three inches in depth, (more or less,) said broken stone being coated with hot coal-tar, preferably a cement of what is known to the trade as "No. 4 coal-tar distillate," in the proportion of about one gallon of the cement to each square yard of pavement. This base or foundation layer is well rolled and rammed with a steam-roller, so that when compacted it will be about three inches in thickness, (more or less,) as above stated.

The second or binder course is composed of clean broken stone or gravel, not exceeding one and one-fourth (1 1/4) inch in largest dimensions, the stone to be heated in any suitable manner and mixed with No. 4 coal-tar distillate in the proportion of about one (1)

preparing the broken stone for this second or binder course care should be exercised to coat 55 each individual stone thoroughly, so that they will be cemented to the base-course and to each other when properly laid. This coating of the broken stone with the cement is best effected by the use of suitable mixing machinery.

The top or wearing surface or course is next placed upon the binder-course, and is to be about one and one-half inch in thickness when compacted. This top or wearing surface is 65 composed of refined Trinidad or other suitable natural asphaltum, heavy petroleum, or the residuum of petroleum, and fine sand.

The proportions of asphaltum and residuum of petroleum or heavy petroleum-oil used may be varied within certain limits, but I prefer 70 to use from fourteen to seventeen parts of residuum of petroleum to each one hundred parts of asphaltum, and sand sufficient to take up the bituminous compound and form a solid mass when cold, and the sand and the asphaltic cement formed by the union of the asphalt and residuum are heated separately prior to being mixed.

The materials and combination of materials forming each layer or course of the pavement, except the first one of broken stone, are laid while in a heated condition, so that the second or binding course is joined or cemented 75 to the base or bottom course and the top or wearing course is cemented to the intermediate or binding course, and in this manner I produce a pavement which will be solid in all its parts and capable of withstanding the action of water and the expansions and contractions incident to thermal changes.

Having thus described my invention, what I claim is—

A concrete pavement consisting of a base or foundation layer of broken stone coated with 95 coal-tar or a coal-tar distillate, a binder or intermediate layer of smaller broken stone similarly coated, and a top or wearing course composed of asphaltum, residuum of petroleum, and sand, substantially as set forth.

In testimony whereof, I have signed my name to this specification at Washington, D. C., this 10th day of May, 1901.

WITNESSES:

J. M. Dabon
Saul S. S. S. S.

INVENTOR

Fredrick J. Warren

BY

Charles H. Joyner
ATTORNEYS

and intermediate layer of smaller broken stone coated with coal-tar, upon which is placed the wearing course or layer of asphaltum, heavy petroleum, or the residuum of petroleum, and fine sand.

In carrying out my invention the road-bed is excavated to the proper depth, preferably about six inches below the surface of the pavement when completed, upon which is laid a foundation-layer of coarse broken stone or gravel about three inches in depth, (more or less,) said broken stone being coated with hot coal-tar, preferably a cement of what is known to the trade as "No. 4 coal-tar distillate," in the proportion of about one gallon of the cement to each square yard of pavement. This base or foundation layer is well rolled and rammed with a steam-roller, so that when compacted it will be about three inches in thickness, (more or less,) as above stated.

The second or binder course is composed of clean broken stone or gravel, not exceeding one and one-fourth (1 $\frac{1}{4}$) inch in largest dimensions, the stone to be heated in any suitable manner and mixed with No. 4 coal-tar distillate in the proportion of about one (1) gallon of the distillate to one (1) cubic foot of stone. This binder-course is spread on the base or foundation course to form a layer of about one and one-half (1 $\frac{1}{2}$) inch in thickness when properly rolled or compacted. In

mass when cold, and the sand and the asphaltic cement formed by the union of the asphalt and residuum are heated separately prior to being mixed.

The materials and combination of materials forming each layer or course of the pavement, except the first one of broken stone, are laid while in a heated condition, so that the second or binding course is joined or cemented to the base or bottom course and the top or wearing course is cemented to the intermediate or binding course, and in this manner I produce a pavement which will be solid in all its parts and capable of withstanding the action of water and the expansions and contractions incident to thermal changes.

Having thus described my invention, what I claim is—

A concrete pavement consisting of a base or foundation layer of broken stone coated with coal-tar or a coal-tar distillate, a binder or intermediate layer of smaller broken stones similarly coated, and a top or wearing course composed of asphaltum, residuum of petroleum, and sand, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

AMZI L. BARBER.

Witnesses:

HENRY J. KEARNEY,

JOHN P. WHITEHORN.

F. J. WARREN.
PAVEMENT.

APPLICATION FILED MAY 16, 1901.

MODEL.

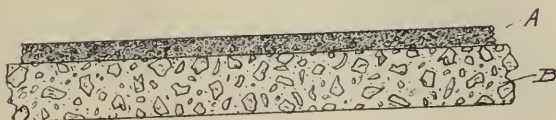


Fig. 1.

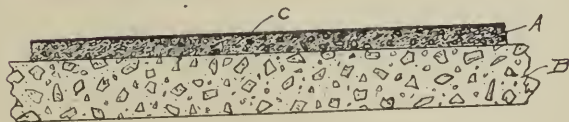


Fig. 2.

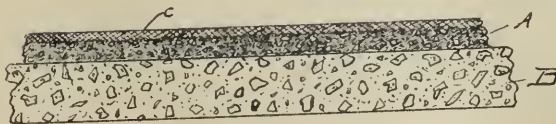


Fig. 3.

WITNESSES:

J. M. Dalton
Saul Lippman

INVENTOR

Fredrick J. Warren

BY

Charles H. Fayman
ATTORNEYS

No. 727,505.

Patented May 5, 1903.

UNITED STATES PATENT OFFICE.

FREDERICK JOHN WARREN, OF NEWTON, MASSACHUSETTS.

PAVEMENT.

SPECIFICATION forming part of Letters Patent No. 727,505, dated May 5, 1903.

Application filed May 16, 1901. Serial No. 60450. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK JOHN WARREN, a citizen of the United States, residing at Newton, in the county of Middlesex and Commonwealth of Massachusetts, have invented a new and useful Improvement in Pavements, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

The invention relates to an improvement in the class of pavements which comprise a base of mineral matter and a plastic uniting medium consisting of a natural or artificial asphalt or coal-tar composition, which are intimately associated together and used as the main upper or top surfacing of the road-bed.

The invention is based upon my discovery that to insure the best conditions of construction, wear, and life in such pavements the portion of the pavement to which my invention relates must be made as dense, as free from voids as possible, and also stable and non-labile to displacement, and upon my further discovery that what has ordinarily been supposed to be the best provision for eliminating voids and establishing stability has, as a matter of fact, been almost the poorest provision for accomplishing these purposes.

The provision usually accepted as the best is that in which the mineral matter used as a basis of the pavement and united by the plastic asphalt vehicle shall be in the shape of a sand or fine gravel. This, however, is an error, as I have discovered by experiment that there is a smaller percentage of voids in a pavement which contains mineral components which are of relatively large size. The method has been in the construction of this

class of pavements to exclude from its composition all pieces of stone or sand larger than one-tenth of an inch in diameter; but by so doing the smallest percentage of voids that it has been possible to produce has been twenty-one per cent. of the aggregate, while

mixture when assembled and compacted together will form a dense, solid, homogeneous, compact body with the smallest percentage of voids and possessing the highest degree of stability, and one in which the largest and smallest pieces are associated with each other indiscriminately throughout the structure, and one which, because of the sizes of the pieces and their arrangement with respect to each other, offers the smallest areas of surfaces for the attachment of the plastic composition to them, so that not only is a superior binding effect or union obtained by the plastic composition, but a smaller quantity of it is necessary for the purpose of obtaining the superior result or product. I prefer to use from one to three per cent. of impalpable powder, from ten to thirty per cent. of material between impalpable powder and one-fourth of an inch in size, and from fifty to eighty per cent. of material larger than one-fourth of an inch in size. I have found that these ingredients when associated together produce a mass or body having less than twenty per cent. of voids. I prefer to use as the uniting or plastic composition one which comprises asphalt and an oil-flux heated to a moderate heat to provide the requisite fluidity; but I do not confine myself to any special form of artificial or natural asphalt. It will be understood that the mineral components are not arranged in the form of layers of the same size, but are mingled with each other from the upper to the lower surface of the pavement, and that the plastic composition permeates the entire mass, uniting the various sized particles thereof, filling the voids, and forming the surfaces.

It will be understood that this pavement is used as the upper or wearing section of a road-bed and that it may be covered, if desired, with a relatively thin surfacing of clear asphalt-cement or an asphalt or bituminous composition of any desired nature. In some instances there may be rolled into this thin

WITNESSES.

J. M. Dalton
Saul V. Applegate

INVENTOR.

Frederick J. Warren
by his attys.
Charles A. Freeman

that to insure the best conditions of construction, wear, and life in such pavements the portion of the pavement to which my invention relates must be made as dense, as free from voids as possible, and also stable and non-labile to displacement, and upon my further discovery that what has ordinarily been supposed to be the best provision for eliminating voids and establishing stability has, as a matter of fact, been almost the poorest provision for accomplishing these purposes. The provision usually accepted as the best is that in which the mineral matter used as a basis of the pavement and united by the plastic asphalt vehicle shall be in the shape of a sand or fine gravel. This, however, is an error, as I have discovered by experiment that there is a smaller percentage of voids in a pavement which contains mineral components which are of relatively large size. The method has been in the construction of this class of pavements to exclude from its composition all pieces of stone or sand larger than one-tenth of an inch in diameter; but by so doing the smallest percentage of voids that it has been possible to produce has been twenty-one per cent. of the aggregate, while by the use of the larger-sized grains or pieces—say up to those which will pass through a two-inch ring—and employing with these larger grains proper quantities of the smaller sizes down to an impalpable powder it is possible to reduce the voids of the mineral base below ten per cent. of its bulk, and such a

tween impalpable powder and one-fourth of an inch in size, and from fifty to eighty per cent. of material larger than one-fourth of an inch in size. I have found that these ingredients when associated together produce a mass or body having less than twenty per cent. of voids. I prefer to use as the uniting or plastic composition one which comprises asphalt and an oil-flux heated to a moderate heat to provide the requisite fluidity; but I do not confine myself to any special form of artificial or natural asphalt. It will be understood that the mineral components are not arranged in the form of layers of the same size, but are mingled with each other from the upper to the lower surface of the pavement, and that the plastic composition permeates the entire mass, uniting the various sized particles thereof, filling the voids, and forming the surfaces.

It will be understood that this pavement is used as the upper or wearing section of a road and that it may be covered, if desired, with a relatively thin surfacing of clear asphalt-cement or an asphalt or bituminous composition of any desired nature. In some instances there may be rolled into this thin surfacing while it is yet soft sufficient sand, gravel, or fine stone to prevent its displacement by traffic.

I will now describe the invention in connection with the drawings, wherein—

Figure 1, is a view in horizontal section of enough of a pavement to illustrate in a con-

PAVEMENT OR ROADWAY

mineral ingredients being less than twenty-
one per cent. of the whole, and the plastic
binder occupying said space.

12. A mixture of mineral or wearing ingre-
dients of several grades, the ingredients of
the descending grades in size and quantity
being so proportioned to each other and to
the voids existing in the larger grades as to
fill the voids and impart to the structure an
inherent stability, in combination with a bi-
tuminous cement or binder.

13. A mixture to be used as a pavement
having an inherent stability composed of min-
eral or wearing ingredients of several grades,
the grades being thoroughly mixed and there-
by uniformly distributed throughout the mass
and being of sizes and quantities so propor-
tioned that ingredients of the same grade are
uniformly in contact with each other, and a
bituminous cement or binder.

FREDERICK JOHN WARREN.

Witnesses:

F. F. RAYMOND, 2d,
J. M. DOLAN.

mineral structure of inherent stability com-
posed of wearing material of several grades
uniformly mixed.

8. A street-paving mixture comprising a
bituminous binder in combination with a
mineral structure of inherent stability.

9. A street-pavement wearing-section com-
posed of a mineral structure of inherent sta-
bility formed of several grades of material so
proportioned as to have a per cent. of voids
less than twenty-one per cent. of the whole,
in combination with a comparatively soft
bituminous binder filling said voids and ren-
dering the whole permanent in nature and
elastic and waterproof in character.

10. A mixture for street-paving purposes
composed of a bituminous binder and a mix-
ture of mineral ingredients of several grades
having less than twenty-one per cent. of voids,
the binder being sufficient in quantity to fill
the voids.

11. A street-paving structure composed of
a mixture of mineral or wearing ingredients,
and a plastic binder, the space between the

WITNESSES.

J. M. Dolan
Saul Sapperton

INVENTOR.

Frederick J. Warren
by his attys
Charles F. Raymond

ventional way the features of my invention, while Figs. 2 and 3 are, corresponding views representing the addition of a surfacing to the structure of Fig. 1.

5 In the drawings, A represents the portion of the road-bed to which my invention relates and which may be called the "wearing-section" of the road-bed and is the portion which covers and is supported by the macadam or other foundation B. In the wearing-section are represented some of the larger mineral pieces, some pieces of intermediate size, and some of the smaller pieces and also the plastic composition which unites them together, and C represents the surfacing to which I have referred. It is represented as somewhat thicker in Fig. 3 than in Fig. 2. It will be understood, however, that the drawings are simply illustrative and that it is not possible to represent the variations in the sizes of the mineral pieces, atoms, and powder which are employed in producing my improved result.

15 In laying the wearing-surface the pieces, particles, and atoms of the base are intimately associated with the plastic asphalt composition, which is then spread uniformly upon the prepared foundation and which in settling becomes very dense, solid, stable, and free from voids than any pavement of which I have knowledge. This density of the structure, stability, and its relative freedom from voids very much improve the wearing properties of the pavement, its resistance to the action of water, and on account of its dense structure prevents the volatilization or oxidation of the essential oils in the cementing medium, increases its life, and while producing these improvements it also enables the wearing-surface to be produced at a smaller cost because a smaller quantity of plastic asphalt material is required than where the percentage of voids is larger.

25 A pavement or wearing-section of a pavement having the features of this invention possesses various advantages, among which are the following: First, the percentage of mineral employed is increased and the percentage of plastic uniting medium decreased as compared with analogous pavements as now laid; second, the wearing properties of the pavement are increased and improved, and this is due to the employment of a larger proportion of mineral to the proportion of the uniting medium and also to the fact that the mineral base is of such a structure, owing to the employment of a considerable percentage of relatively larger pieces, larger than are now used, that a very rigid and stable effect is obtained and one which reduces strain and wear upon the uniting medium, more of the wear being borne by the mineral base and less by the uniting medium than is common; third,

medium contained in them forms a cellular structure, which is stronger and adheres better to the surfaces of the mineral components than where the voids or interspaces are more numerous and of less size.

Because of the inherent stability obtained by me by the careful selection and proportioning of several grades of mineral ingredients I am enabled to use an asphalt or bituminous uniting medium of a softer nature and at a lower temperature than could otherwise be used. This is because in my case the wear and strain fall upon the mineral ingredients and not upon the binder, which latter may be as soft as desirable. In this application, however, I do not claim, broadly, a binder or cement of this character. I have reserved the same to be claimed in my co-pending application Serial No. 60,819.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States—

1. A street-pavement mixture composed of mineral ingredients ranging in grades from three inches down to an impalpable powder, from fifty to eighty per cent. of such mineral ingredients lying between one-fourth inch and three inches in diameter, in combination with a bituminous binder.

2. A street-pavement mixture composed of mineral ingredients of several grades from an impalpable powder to three inches in diameter, over fifty per cent. of such ingredients being larger than one-fourth inch in diameter, and a bituminous binder.

3. A street-pavement mixture composed of mineral or wearing ingredients, of which approximately fifty to eighty per cent. are between one-fourth inch to three inches in diameter, approximately ten to forty-nine per cent. between an impalpable powder and one-fourth inch in diameter, and approximately one to three per cent. of an impalpable powder, in combination with a binder.

4. A street-pavement mixture composed of mineral or wearing ingredients, of which approximately fifty to eighty per cent. lies between one-fourth inch and three inches in diameter, approximately ten to forty-nine per cent. between an impalpable powder and one-fourth inch in diameter, and approximately one to three per cent. an impalpable powder, in combination with a bituminous binder, of which the soft, oily constituent is sufficiently great to render the binder itself too flexible to maintain the structure rigid.

5. In a street-pavement, a bituminous mineral structure, the mineral ingredients of which are mixed and of several grades, so graded as to give the structure an inherent stability.

6. A bituminous street-pavement structure containing mixed mineral ingredients of such

mineral ingredients being less than twenty-
one per cent. of the whole, and the plastic
binder occupying said space.

12. A mixture of mineral or wearing ingre-
dients of several grades, the ingredients of
the descending grades in size and quantity
being so proportioned to each other and to
the voids existing in the larger grades as to
fill the voids and impart to the structure an
inherent stability, in combination with a bi-
tuminous cement or binder.

13. A mixture to be used as a pavement
having an inherent stability composed of min-
eral or wearing ingredients of several grades,
the grades being thoroughly mixed and there-
by uniformly distributed throughout the mass
and being of sizes and quantities so propor-
tioned that ingredients of the same grade are
uniformly in contact with each other, and a
bituminous cement or binder.

FREDERICK JOIN WARREN.

Witnesses:

F. F. RAYMOND, 2d,
J. M. DOLAN.

mineral structure of inherent stability com-
posed of wearing material of several grades
uniformly mixed.

8. A street-paving mixture comprising a
bituminous binder in combination with a
mineral structure of inherent stability.

9. A street-pavement wearing-section com-
posed of a mineral structure of inherent sta-
bility formed of several grades of material so
proportioned as to have a per cent. of voids
less than twenty-one per cent. of the whole,
in combination with a comparatively soft
bituminous binder filling said voids and ren-
dering the whole permanent in nature and
elastic and waterproof in character.

10. A mixture for street-paving purposes
composed of a bituminous binder and a mix-
ture of mineral ingredients of several grades
having less than twenty-one per cent. of voids,
the binder being sufficient in quantity to fill
the voids.

11. A street-paving structure composed of
a mixture of mineral or wearing ingredients,
and a plastic binder, the space between the

WITNESSES.

J. M. Dolan
Saul Sappanathan

INVENTOR.

Frederick J. Warren
by his attys.
Charles H. Raymond

F. J. WARREN.
PAVEMENT OR ROADWAY

structure prevents the volatilization or oxidation of the essential oils in the cementing medium, increases its life, and while producing these improvements it also enables the wearing-surface to be produced at a smaller cost because a smaller quantity of plastic asphalt material is required than where the percentage of voids is larger.

A pavement or wearing-surface of a pavement having the features of this invention possesses various advantages, among which are the following: First, the percentage of mineral employed is increased and the percentage of plastic uniting medium decreased as compared with analogous pavements as now laid; second, the wearing properties of the pavement are increased and improved, and this is due to the employment of a larger proportion of mineral to the proportion of the uniting medium and also to the fact that the mineral base is of such a structure, owing to the employment of a considerable percentage of relatively larger pieces, larger than are now used, that a very rigid and stable effect is obtained and one which reduces strain and wear upon the uniting medium, more of the wear being borne by the mineral base and less by the uniting medium than is common; third, the interspaces or voids formed by such mineral components are also of a different character, in that they are larger and fewer, and therefore the asphalt or bituminous uniting

3. A street-pavement mixture composed of mineral or wearing ingredients, of which approximately fifty to eighty per cent. are between one-fourth inch to three inches in diameter, approximately ten to forty-nine per cent. between an impalpable powder and one-fourth inch in diameter, and approximately one to three per cent. of an impalpable powder, in combination with a binder.

1. A street-pavement mixture composed of mineral or wearing ingredients, of which approximately fifty to eighty per cent. lies between one-fourth inch and three inches in diameter, approximately ten to forty-nine per cent. between an impalpable powder and one-fourth inch in diameter, and approximately one to three per cent. an impalpable powder, in combination with a bituminous binder, of which the soft, oily constituent is sufficiently great to render the binder itself too flexible to maintain the structure rigid.

5. In a street-pavement, a bituminous mineral structure, the mineral ingredients of which are mixed and of several grades, so graded as to give the structure an inherent stability.

6. A bituminous street-pavement structure containing mixed mineral ingredients of such grades as to give the structure an inherent stability.

7. A bituminous street-pavement mixture comprising a binder in combination with a

WITNESSES.

J. M. Dalton
Saul Sappan

INVENTOR.

Frederick J. Warren
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Charles H. Raymond

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PAVEMENT OR ROADWAY

[This Drawing is a reproduction]

BOULTS COMPLETE SPECIFICATION

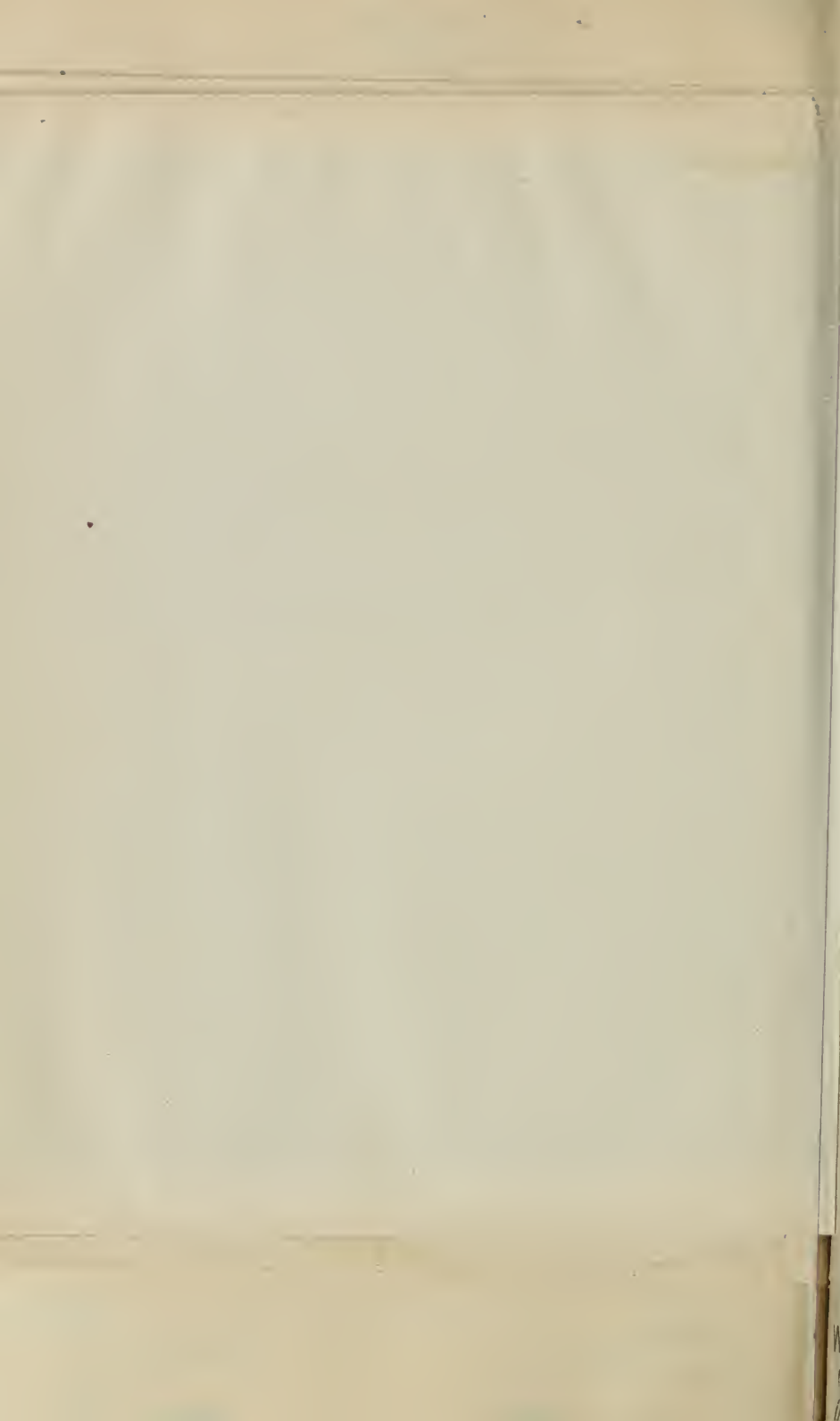


WITNESSES.

J. M. Dalton
Saul Suppawatt

INVENTOR.

Frederick J. Warren
by his atty.
Clark & Raymond



Date of Application, 20th Dec., 1887
Specification Accepted, 20th Jan., 1888

[Stamped on face]: Library U. S. Patent Office Received Mar 13, 1888.

A. D. 1887, 20th DECEMBER. No 17,483.

COMPLETE SPECIFICATION.

Improvements in Concrete Pavements.

A communication from AMIZI LORENZO BARBER, of Columbia Heights, Washington, in the District of Columbia, United States of America.

I, ALFRED JULIUS BOULT of 323 High Holborn in the County of Middlesex, M. I. M. E. do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

5 This invention relates to certain improvements in concrete pavements.

The object of this invention is to thoroughly lock or cement the different layers or stratas of which the pavement is composed more especially to form a bond of union between the upper or wearing course and the intermediate or binding course so that there will be less liability to crack and disintegrate under the influences of heat, cold or moisture.

In the drawing is shown a transverse sectional view of a pavement laid according to this invention.

In carrying out this invention the road bed is graded to the proper depth upon which is placed a layer of cement concrete A, said concrete being made of Portland 15 or other good hydraulic cement, clean sharp sand and broken stone, brick or gravel and laid to the depth of three or more inches, the thickness of this layer being dependent on the probable traffic of the road or street to be paved.

The proportions of ingredients used in this concrete base may be varied, but it is preferred to use them in the following proportions:—

20 One measure of hydraulic cement and two measures of clean sharp sand free from clay or other extraneous matter is mixed with a suitable amount of water to form a mortar.

Broken stone, or hard broken brick or gravel of the proper size, either separate or combined, is soaked or saturated with water, and while in this saturated condition is 25 mixed with the mortar above described the quantity of broken stone being such as will give a surplus of mortar when the concrete is rammed down on the road bed.

The mixing of the broken stone with the mortar may be done by hand or with the mixing of the broken stone with the mortar may be done by machine or until each piece of broken stone or

WITNESSES.

J. M. Dalton
Saul V. Applegate

INVENTOR.

Frederick J. Warren
by his attys.
Charles H. Freeman

Boul's Improvements in Concrete Pavements.

the surface. The upper surface of this layer or bed of concrete is finished with a smooth surface and so shaped as to correspond to the curvature of the crown or upper surface of the pavement. When this foundation layer or course of hydraulic concrete has set or become sufficiently hard, the cementing or locking course B is placed thereon which is composed of the following materials:—

Broken stone about one inch in largest diameter is thoroughly screened in order to free it from dust is heated by passing the same through revolving heaters and while in this heated condition is mixed by means of machinery or otherwise, with the residuum of coal tar distillate which is known in the trade as No. 4, or any other number, or with coal tar product and asphaltum and petroleum oil combined until each stone is 10 perfectly and evenly coated with the bituminous matter, care being exercised, in order to avoid a surplus of the bituminous material. About one half gal. of the coal tar product is used for each cubic foot of broken stone this amount being sufficient to firmly bind the broken stone together without having a surplus of the bituminous material to run down and fill the voids between the broken stone. 15

Instead of using broken stone, gravel and sand mixed together may be used, or a combination of broken stone, gravel and sand, when the same is coated with the bituminous compound.

A layer of suitable thickness of the broken stone, thus prepared is laid on the hydraulic concrete base A and rolled or compacted in any suitable manner so as to 20 form a substantial bed for the top or wearing course C.

The top or wearing course C is composed of refined Trinidad or other suitable asphaltum, heavy petroleum, or the residuum of petroleum, fine sand, and powdered carbonate of lime, mineral dust, or any other finely divided mineral material. The portions of the above mentioned substances will depend upon the character and traffic 25 of the street, and in some cases the carbonate of lime or mineral dust may be omitted; this will depend on the quality of the sand.

In order to protect the sides of the pavement from the deteriorating effects of moisture and the urine of animals, the same is coated with coal tar cement or other resinous pitch which is ironed in and smoothed down with hot smoothing irons on and 30 into the surface or wearing course C.

This strim of coal tar is shown at D and extends outward from the curb, a distance of about two feet more or less and when laid as described effectually protects the gutters from rapid disintegration.

The advantage of a pavement laid in the manner described is that the bituminous 35 matter employed in cementing the broken stone of the middle or binding course B will cause the wearing surface or top layer C to adhere thus forming a solid or comparatively solid mass, which increases the strength of the pavement and at the same time will be pliable enough to prevent the cracking of the surface layer.

Having now particularly described and ascertained the nature of this invention, as 40 communicated to me by my foreign correspondent, and in what manner the same is to be performed, I declare that what I claim is:—

1. A concrete pavement consisting of a base of hydraulic concrete an intermediate 45 or binding course of broken stone coated with bituminous material and a top or wearing surface of bituminous concrete as described.
2. A concrete pavement consisting of a base of hydraulic concrete an intermediate layer or binding course of broken stone coated with bituminous material and a top or 50 wearing surface of asphaltic concrete.

Dated this 20th day of December 1887.

W. P. THOMPSON & BOLLT, 50
Agents.

F. J. WARREN.
PAVEMENT OR ROADWAY.

(Application filed Jan. 9, 1901.)

(No Model.)

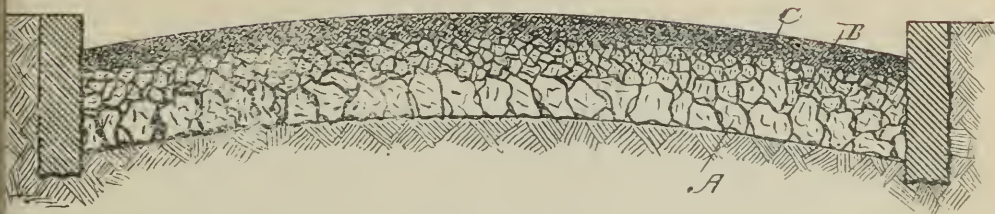


Fig. 1.

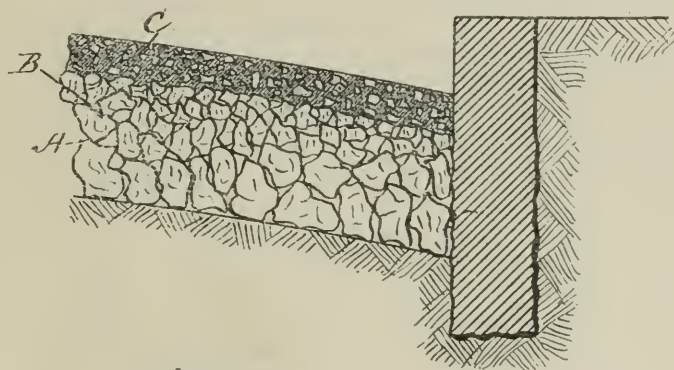


Fig. 2.

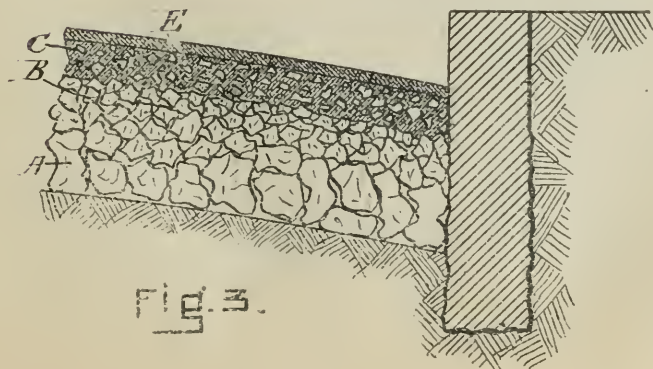


Fig. 3.

WITNESSES.

J. M. Dalton
Saul Sappan

INVENTOR.

Frederick J. Warren
by his atty.
Charles H. Raymond

THE UNIVERSITY OF CHICAGO

1911

W. WILSON.
ROADWAY.

APPLICATION FILED JUNE 12, 1903.

NO MODEL.

UNITED STATES PATENT OFFICE.

FREDERICK J. WARREN, OF NEWTON, MASSACHUSETTS.

PAVEMENT OR ROADWAY.

SPECIFICATION forming part of Letters Patent No. 675,430, dated June 4, 1901.

Application filed January 9, 1901. Serial No 42,626. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK J. WARREN, a citizen of the United States, residing at Newton, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Pavements or Roadways, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

The invention relates to a pavement or roadway having a foundation layer of stone such as is used in ordinary Macadam or Telford roads or a combination of the two, and upon which is arranged one or more layers of smaller stone coated or partly coated with coal-tar, coal-tar pitch, asphalt, or a mixture of them or other equivalent bituminous material, and which is thoroughly rolled preparatory to receiving a finishing or binding layer consisting of crushed or broken stone or gravel mixed with fine crushed screenings, sand, gravel, or other equivalent earthy matter in such proportion that the fine particles of stone, sand, or gravel in said surface or binder layer will readily enter and fill the large voids and spaces in and between the larger stone and gravel, the said last-named ingredients being first thoroughly mixed with able machinery with coal-tar, coal-tar pitch, asphalt, or a mixture of them or equivalent bituminous material, thoroughly incorporated with them and in such proportions as to form a solid impervious bituminous wearing surface or binder united by pressure and by permeation with the intermediate course or layer of stone upon which it is erected, and with the voids and spaces therein the under surface of the said surfacing or binder layer knits. This surfacing or binding layer is preferably of uniform thickness throughout and consolidated by means of pressure or a heavy steam-roller.

The invention will now be described in connection with the drawings, wherein—

Figure 1 is a view in vertical section of a pavement having the features of my invention.

the Macadam order or the Telford arrangement or a combination of the two, and it is laid in any usual way. Upon it is arranged the layer B of smaller stone, which preferably are coated or partly coated with coal-tar, coal-tar pitch, asphalt, or a mixture of them or other equivalent bituminous material. The stones composing this layer will vary in size from two inches in diameter to six inches in diameter, and the layer is thoroughly rolled into the foundation layer and will when completed furnish a surface which is coarse and a constituency which is more or less cellular in character. Upon and into this prepared surface is then thoroughly rolled a heavy layer of specially prepared ingredients which have reference to their packing and binding character with regard to each other and also with respect to the character of the surface which is to receive it and of the voids, cells, or spaces in it. This layer is a binding or surfacing layer, and it is constituted to unite with the rough surface of its supporting-layer by entering the spaces, channels, and voids between the stones thereof to a very considerable extent and so as to fill them. It is further constituted to make a continuous, homogeneous, solid layer of its own composition above the line of union with the layer below and to provide a hard, firm, solid, waterproof, tenacious, non-friable covering for the foundation, and the surface of which may serve as the finished surface of the pavement or may act to receive a finishing-surface of a somewhat different character. It is obvious from what I have said that this layer must be very carefully prepared, as upon it hinges the effectiveness of the invention. It is composed of a mixture of relatively coarse particles one-half inch to three inches in diameter, intermediate particles one-tenth inch to one-half inch in diameter, and fine particles (an impalpable powder) to one-tenth inch in diameter, suitably proportioned, graded, and thoroughly mixed, either hot or cold, with an incorporated composition of coal-tar, coal-tar pitch, asphalt, or other equivalent bituminous material or a combination of them. The

Witnesses
Paul S. Ober
H. L. Snyder

Inventor:
William Wilson.
By his Attorney
Hamstockbridge

20 paratory to, receiving a finishing or binding layer consisting of crushed or broken stone or gravel mixed with fine crushed screenings, sand, gravel, or other equivalent earthy matter in such proportion that the fine particles
25 of stone, sand, or gravel in said surface or binder layer will readily enter and fill the large voids and spaces in and between the larger stone and gravel, the said last-named ingredients being first thoroughly mixed with
30 or without heating and preferably by suitable machinery with coal-tar, coal-tar pitch, asphalt, or a mixture of them or equivalent bituminous material, thoroughly incorporated with them and in such proportions as to form
35 a solid impervious bituminous wearing surface or binder united by pressure and by permeation with the intermediate course or layer of stone upon which it is erected, and with
40 the voids and spaces therein the under surface of the said surfacing or binder layer knits. This surfacing or binding layer is preferably of uniform thickness throughout and consolidated by means of pressure or a heavy steam-roller.

45 The invention will now be described in connection with the drawings, wherein—

Figure 1 is a view in vertical section of a pavement having the features of my invention. Fig. 2 is a detail view in section, enlarged, of Fig. 1. Fig. 3 is a detail view in section, enlarged, of a modification.

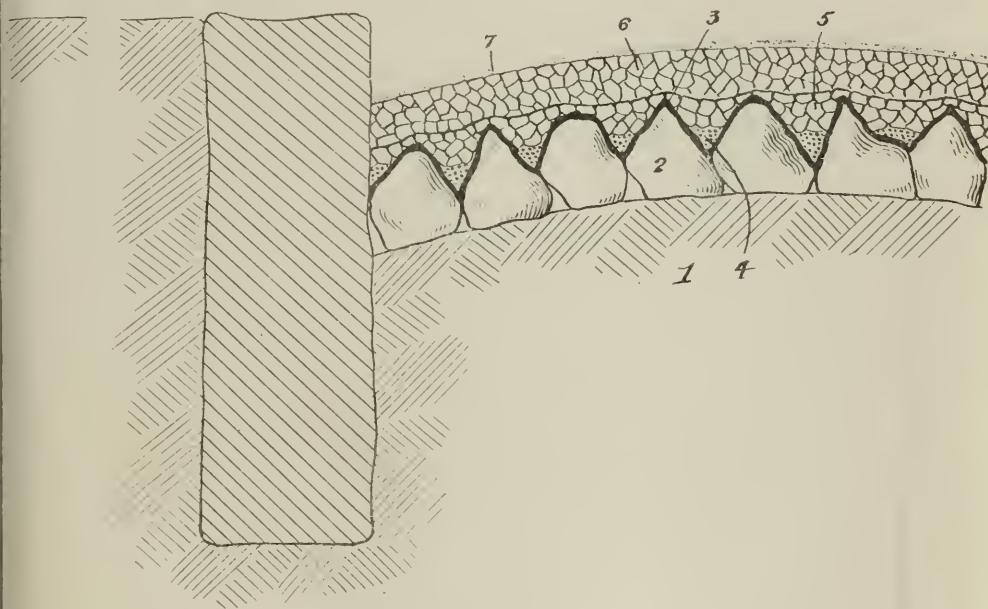
The foundation layer of stone A may be of

ceive it and of the voids, cells, or spaces in it. This layer is a binding or surfacing layer, and it is constituted to unite with the rough
75 surface of its supporting-layer by entering the spaces, channels, and voids between the stones thereof to a very considerable extent and so as to fill them. It is further constituted to make a continuous, homogeneous,
80 solid layer of its own composition above the line of union with the layer below and to provide a hard, firm, solid, waterproof, tenacious, non-friable covering for the foundation, and the surface of which may serve as the finished
85 surface of the pavement or may act to receive a finishing-surface of a somewhat different character. It is obvious from what I have said that this layer must be very carefully prepared, as upon it hinges the effectiveness of the invention. It is composed of
90 a mixture of relatively coarse particles one-half inch to three inches in diameter, intermediate particles one-tenth inch to one-half inch in diameter, and fine particles (an impalpable powder) to one-tenth inch in diameter,
95 suitably mixed, either hot or cold, with an incorporated composition of coal-tar, coal-tar pitch, asphalt, or other equivalent bituminous material or a combination of them. The
100 ingredients are such as will pass through screens having a three-inch mesh, a half-inch mesh, one-tenth of an inch mesh, one-fortieth of an inch mesh, one-eightieth of an

W. WILSON.
ROADWAY.

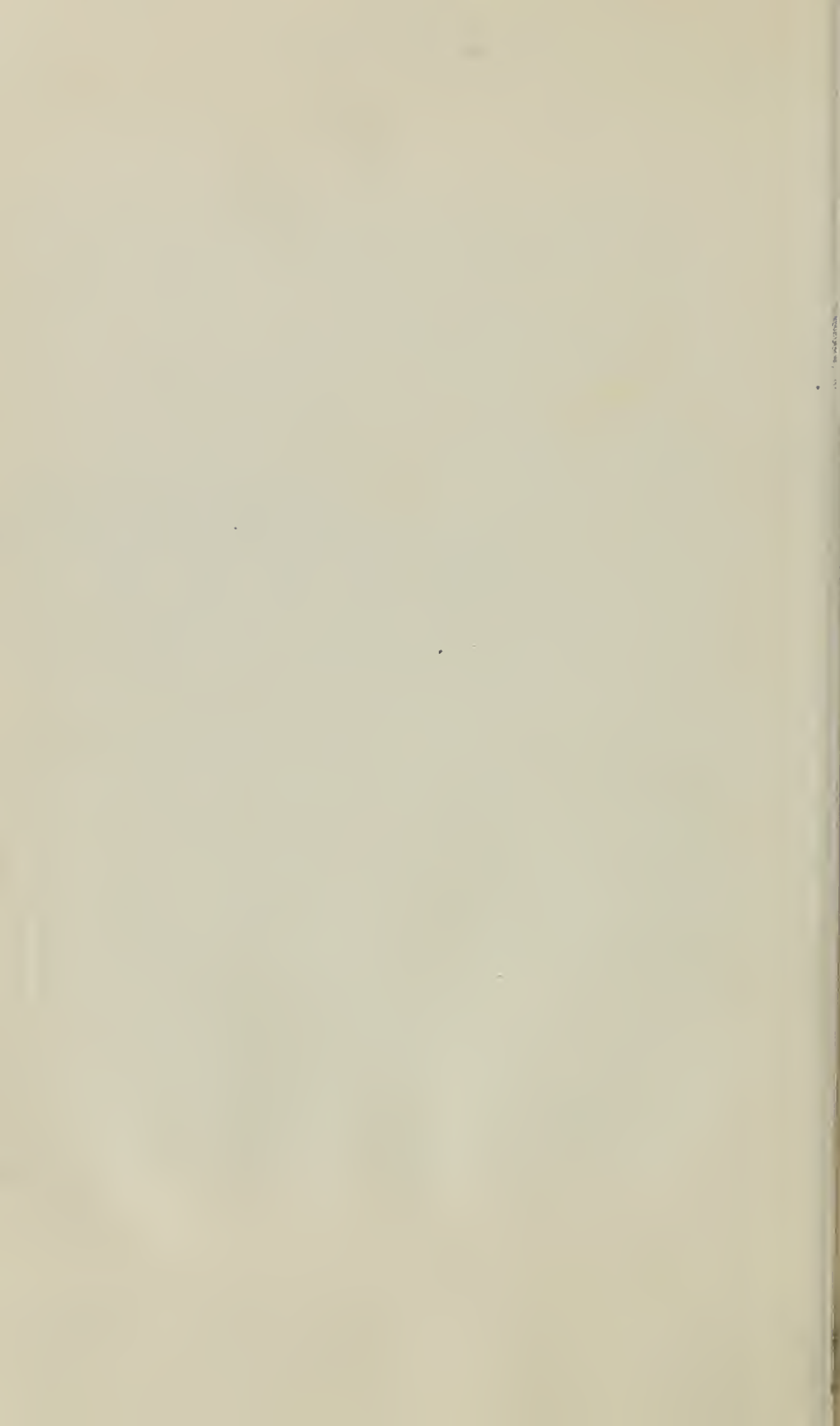
APPLICATION FILED JUNE 12, 1903.

NO MODEL.



Witnesses
Charles Ober
H. L. Snyder

Inventor
William Wilson.
By his Attorney
H. M. Stockbridge



Patented
in W. Deane

No. 748,248.

Patented December 29, 1903

UNITED STATES PATENT OFFICE.

WILLIAM WILSON, OF GENEVA, NEW YORK.

ROADWAY.

SPECIFICATION forming part of Letters Patent No. 748,248, dated December 29, 1903.

Application filed June 12, 1903. Serial No. 161,145. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM WILSON, a citizen of the United States, residing at Geneva, Ontario county, New York, have invented certain new and useful Improvements in Roadways, of which the following is a specification.

The object of my invention is to provide an improved roadway which shall have all the advantages of the well-known Telford and tarred Macadam roadways and which shall overcome many of the objections to both.

The invention consists of a roadway having a layer of comparatively large irregularly shaped stones laid adjacent to each other with one broad flat face of each lowermost, having the upper surfaces of said stones coated with a bituminous substance, having the apices of the angular spaces between said stones filled with a mixture of a bituminous substance with sand and stone screenings, tamped in place, and having the remaining portions of the spaces between said stones filled with tarred macadam material, consisting of stones coated or mixed with a bituminous substance, the said macadam material being subjected to compression to force and hold the same in place.

The invention also consists in the novel method of laying the roadway, as will be more fully hereinafter described and claimed.

In the drawing forming part of this specification the figure thereof is a cross-sectional view of a portion of a roadway constructed in accordance with my invention.

In carrying out my invention the road-bed 1 is formed by suitably grading the earth between the curbs, and on this bed is placed by hand a layer of comparatively large stones 2, varying somewhat in size from six to twenty inches in length, from four to eight inches in width, and from six to ten inches in height. These stones are taken just as they come from the quarry, and each is laid on the bed with one of its flat sides lowermost. After

apices of the angular spaces 4 between them are filled with a mixture of tar or other bituminous substance and sand, stone screenings, or the like, which mixture is carefully tamped into place. When this has been done, the remaining portions of the spaces between said stones are filled with tarred macadam material—that is, a mixture of broken stones, preferably from one-half inch to two and one-half inches in size, and tar or other bituminous substance, together with a substance such as sand, stone-dust, or screenings. This material constitutes a filler 5 and extends up to a point in line with or slightly above or below the tops of the stones 2. The same is tamped into place and afterward it is further compressed, as by passing a heavy roller over the same. The rolling process will cause slight depressions to be formed between the tops of the adjacent stones 2, but tends to thoroughly and completely compact the mass between said stones. When the rolling operation has been effected, a layer 6 of tarred macadam material exactly the same as the material 5 is placed upon the upper surface of the road, rolled and compacted. The result is that the upper surface of the roadway will be evenly arched or leveled with no danger of the formation of pockets or recesses for the reception of water afterward. A thin top dressing 7 of a bituminous substance mixed with sand, stone screenings, or the like may be laid upon the upper surface of the layer 6 for the purpose of forming a smooth and finished condition to the upper surface of the completed roadway.

It has been stated heretofore that the filler 5 of tarred macadam material is composed of comparatively small stones mixed with tar or other bituminous substance and sand, stone-dust, or screenings. I do not limit myself, however, to any particular size of stones or even to small stones. Large stones coated with a bituminous substance may

183,507.

E. C. WALLACE.

PROCESS FOR PRODUCING WEARING SURFACES FOR STREETS AND ROADS.

APPLICATION FILED MAY 21, 1910.

Patented May 16, 1916.

Edwin C. Wallace
Addison G. Du Bois,
his Attorney

between the same and the sides of the stones 2 should be filled either with a very fine tarred macadam material or with the same substance that is employed in filling the apices of the angular spaces 4.

The coating of the stones 2 with the layer 3 of tar or other bituminous substance serves to effect a complete and lasting bond between said stones and the tarred macadam filler 5. Furthermore, as the stones 2 are laid with one flat face of each lowermost the danger of the sinking of the road-foundation into the road-bed is reduced to a minimum. Lateral separation of the stones 2, which constitute the foundation, is prevented by the filler 5 of tarred macadam material, and the said filler 5 also serves to build up and form a stable and reliable body for the road. The fine tarred macadam material is used in the apices of the angular spaces 4 in order to insure a complete filling of said spaces. If the ordinary tarred macadam material of which the filler 5 is made were employed for this purpose, it would in many cases be prevented from penetrating to the extreme lower ends of said spaces by reason of the fact that the stones which form part of said material are too large.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A roadway having a layer of comparatively large irregularly-shaped stones laid adjacent to each other with one broad flat face of each lowermost, having the upper surfaces of said stones coated with a bituminous substance, having the apices of the angular spaces between said stones filled with a mixture of a bituminous substance with sand and stone screenings, tamped in place, and having the remaining portions of the spaces between said stones filled with a tarred macadam material, consisting of stones coated or mixed with a bituminous substance, the said macadam ma-

terial being subjected to compression to force and hold the same in place.

2. The method of laying a roadway, which consists in placing a layer of comparatively large irregularly-shaped stones upon a suitable bed, with one broad, flat face of each lowermost, coating the upper surfaces of said stones with a bituminous substance, filling the apices of the angular spaces between said stones with a mixture of a bituminous substance with sand or stone screenings, and tamping it into place, filling the remaining portions of the spaces between said stones with tarred macadam material, consisting of stones coated or mixed with a bituminous substance, and subjecting said tarred macadam material to compression.

3. The method of laying a roadway, which consists in placing a layer of comparatively large irregularly-shaped stones upon a suitable bed, with one broad, flat face of each lowermost, coating the upper surfaces of said stones with a bituminous substance, filling the apices of the angular spaces between said stones with a mixture of a bituminous substance with sand or stone screenings, and tamping it into place, filling the remaining portions of the spaces between said stones with tarred macadam material, consisting of stones coated or mixed with a bituminous substance, tamping and rolling down said tarred macadam material, placing a layer of the same material on top of that previously laid, rolling the latter layer down into place, and finally applying a top dressing or surface coating to complete the roadway.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WM. WILSON.

Witnesses:

R. A. KANFIELD,
C. D. WOODCOCK.

AUGUST E. SCHUTTÉ, OF CAMBRIDGE, MASSACHUSETTS, ASSIGNOR TO
WARREN BROTHERS COMPANY OF CHARLESTON, WEST VIRGINIA,
A CORPORATION OF WEST VIRGINIA, OF BOSTON, MASSACHUSETTS.

PROCESS OF LAYING PAVEMENTS.

SPECIFICATION forming part of Letters Patent No. 768,698, dated August 30, 1904.

Application filed August 21, 1902. Serial No. 120,576. (No specimens.)

To all whom it may concern:

Be it known that I, AUGUST E. SCHUTTÉ, a subject of William, Emperor of Germany, having taken out my first naturalization papers as a citizen of the United States, residing in Cambridge, in the county of Middlesex and State of Massachusetts, have invented a new and useful Process of Laying Pavements of That Class Known as "Bituminous Macadam," of which the following is a specification.

The bituminous macadam is a pavement now generally well known, and consists of a mixture of coarse stone and bitumen upon a suitable foundation. The stony ingredients roughly interlock, and the voids or interstices between the same contain a bituminous cement or binder for holding the stones in position.

In the manufacture of bituminous macadam pavements or roadways of such character it is desirable that the binding-cement shall very closely fill the voids between the stone which forms the body of the roadway. As a means for accomplishing this result I have devised the following process: These roadways are ordinarily laid upon a foundation of some kind.

While the foundation forms no part of my present invention and may be of any desired character, I prefer to have such foundation made of a layer of coarse cracked stone coated with a hard bituminous cement which shall serve as a binder, so that when the foundation is rolled firmly in place it shall so remain. In making a roadway by my improvement upon a foundation either so or otherwise constructed I

lay a soft matrix—say from one to one and a half inches thick—preferably produced from "bituminous cement,"—so called, mixed with fine sand and stone—say from about one-fourth of an inch in diameter to the finest dust. This matrix is spread to a thickness in proportion to the thickness of the pavement desired. Upon this matrix while still hot is placed a layer of the larger stone of about one and a half inches in diameter, preferably already coated with bituminous cement and in a heated condition.

These stones are then rolled by a heavy roller or otherwise embedded in the matrix, which is caused by the rolling or embedding process

to receive the stone and ooze up between the stones, so that the stone is thoroughly embedded in the matrix. All the voids are thus filled, and perhaps a light coating or surfacing is formed for the roadway. This coating may be sufficient to form the finishing-surface of the roadway. If desired, however, an additional thin finishing-coat of some proper character—for example, any one of the finishing-coatings now in use which will combine with the matrix and stone surfacing—may be laid upon the roadway so constructed.

This process is simple and easy to carry out and forms a firm, hard, and elastic roadway well fitted for all the ordinary uses of travel.

What I claim as my invention is—

1. That process of making a bituminous macadam roadway which consists in laying a matrix of the character described upon a suitable foundation and pressing into it a layer of coarse stone whereby said stone will be embedded in the matrix and the matrix will fill the voids between the stones as described.

2. That improvement in the art of making bituminous macadam roadways which consists in forming a foundation of crushed stone or the like, laying thereon a matrix composed of bituminous cement, sand and small stone and then embedding in said matrix a layer of coarse stone as set forth.

3. That improvement in the art of making bituminous macadam roadways which consists in laying upon a suitable foundation a matrix composed of bituminous cement or the like mixed with fine sand and small stone, embedding in said matrix by pressure larger stone whereby said matrix will be caused to fill the voids between said larger stone, and adding thereto a finishing-coating as and for the purposes described.

4. That improvement in the art of making bituminous macadam roadways which consists in laying upon a suitable foundation a matrix made from small stone, sand and a bituminous cement and adding thereto a layer of coarse stone coated with bituminous cement while hot and embedding said coarse stone in said matrix by pressure as and for the purposes described.

Edwin C. Wallace
Addison G. Du Bois,
his Attorney

Revised
in 10 Deane

5. That process of making a bituminous macadam roadway which consists in laying a matrix to a predetermined depth upon a suitable foundation then applying to the top thereof such a layer of selected stone that upon subsequent rolling, the stone is forced into the matrix to form a bituminous macadam mixture, then applying such pressure on the surface as to accomplish the desired results.

6. That process of making a bituminous macadam roadway which consists in laying a matrix to the depth of about one to one and one-half inches upon a suitable foundation then applying to the top of such matrix a layer of stone of sizes of approximately one and one-half inches, and applying such pressure on the surface as to force the stone through the matrix.

7. That process of making a bituminous macadam roadway which consists in placing

upon a suitable foundation a layer of matrix, placing upon such matrix, coarse uneven stones such as will interlock with each other upon being subjected to pressure, and then pressing such stones together and into the matrix, and into closely interlocking relation to each other.

8. That process of making a bituminous macadam roadway which consists in placing upon a suitable foundation a layer of matrix substantially as described, placing stone upon the surface of such matrix and then forcing such stones in the matrix and into an interlocking contact with each other in such a way that the matrix fills the voids between the stones.

AUGUST E. SCHUTTE.

Witnesses:

M. D. NEWMAN,

SAUL SIEPERSTEIN.

183,507.

Patented May 16, 1916.

UNITED STATES PATENT OFFICE. 499

JOSEPH HAY AMES, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE AMES ASPHALT COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF SOUTH DAKOTA.

METHOD OF MAKING AND LAYING PAVING COMPOSITION.

932,941.

Specification of Letters Patent.

Patented Aug. 31, 1909.

No Drawing.

Application filed May 1, 1903. Serial No. 493,298.

To all whom it may concern:

Be it known that I, Joseph Hay Ames, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Method of Making and Laying Paving Composition, of which the following is a specification.

The object of the herein described invention is to secure perfect inherent stability in a paving composition after it has been laid and rolled to a finished condition.

In sheet asphalt paving as commonly practiced, about 31 per cent. of voids are found. In some cases, a bituminous macadam composition for paving has been made reducing this percentage of voids to from 15 to 18% of voids. These voids, however, form pockets for carbonic acid gas that in time destroys the pavement. It is acknowledged by the experts of the art that a perfect voidless pavement would be an age-lasting one.

In practice, the run of the stone crusher is taken and each ton of crushed stone is kept separate. The dust is as nearly as possible screened out of each ton of crushed stone and weighed, so that the exact proportion of dust to stone is ascertained. This stone dust is separately treated and kept separate from the other portion of the ton batch of crushed stone for the reason that better results are obtained by treating them separately. This is necessary to the success of the process because in cases where stone dust is treated in combination with the whole batch, the coarser materials separate in handling and the larger pieces will bunch together when the pavement is laid and the smaller particles will also form together in the pavement, thereby resulting in irregularity of density. The stone dust in a cold condition is coated with a suitable thin oil, like crude oil and gasoline, or gas oil, alcohol, benzine or any light oil which will answer the purpose and which may be found to be the cheapest. The employment of the thin oil is to cover over the usually moisture covered particles of the stone dust and make it acceptable to the hot bituminous, asphaltic or like cement

which is to be applied. After this second application a due amount of calcium oxid or partly slaked lime will be added and mixed in. The same treatment will be given to the other portion of the batch ton of stone. These compositions will be cooled and treated in a manner to secure a friable and granular condition of the composition.

When laid in the street or road, the exact measures of the two compositions will be associated as originally found by weight to be their relations in proportion. It has been found best to lay a layer of the coarser materials and throw over these the finer materials to fill the voids, and this is kept up in successive layers in exact proportions of the two compositions. When this has been done to a thickness demanded by the specifications provided for the street or road building the composition will be compressed. This will be preferably effected by using at first a very light roller which will be run in every possible direction over the composition to secure an accurate placing of the particles. Then a heavy roller will be used to complete the compression. All the voids will thus be filled and a perfect voidless pavement secured.

What I claim is:—

The herein described method of paving which consists in taking batches of crushed stone, separating the finer portions from the coarser portions of the batch, separately treating these two portions with a bituminous or like cement, then laying a part of the coarser portions of the batch, then placing thereover and therethrough a part of the finer portion of the batch until all the existing voids of the coarser matter are filled, then again and again repeating the laying of these two portions in successive layers and finally compressing the whole, substantially as described.

In testimony whereof I have signed my name.

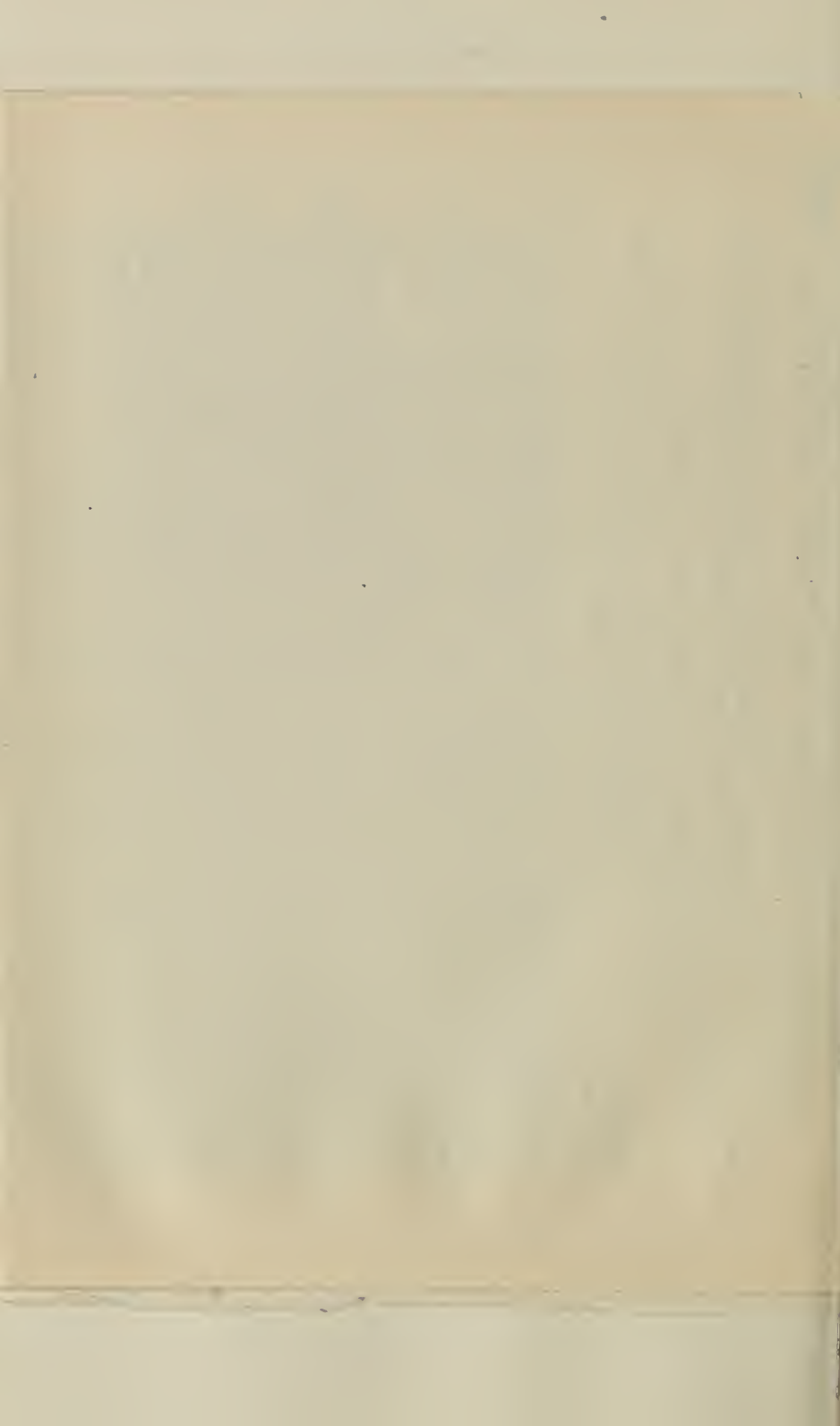
JOSEPH HAY AMES.

Witnesses:

WILLIAM J. JACKSON,

MABEL KIMMIG.

Edwin C. Wallace
Addison G. Du Bois
Attorney



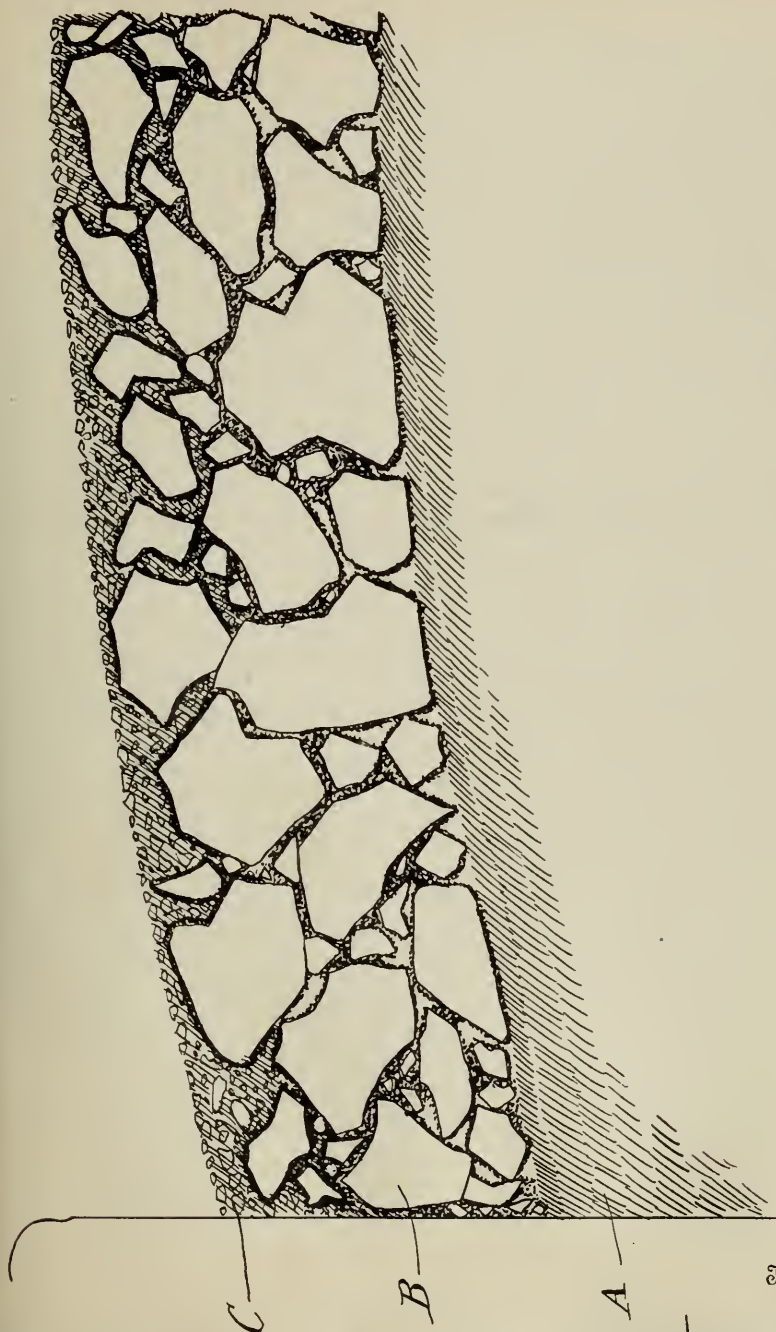
E. C. WALLACE.

PROCESS FOR PRODUCING WEARING SURFACES FOR STREETS AND ROADS.

APPLICATION FILED MAY 21, 1910.

,183,507.

Patented May 16, 1916.



Inventor

Witnesses
J. P. Kewell
Wm. O. Deane

By

Edwin C. Wallace
Addison G. Du Bois,
his Attorney

1,183,507.

Specification of Letters Patent.

Patented May 16, 1916.

Application filed May 21, 1910. Serial No. 562,752.

To all whom it may concern:

Be it known that I, EDWIN C. WALLACE, a citizen of the United States, residing at East Auburn, in the county of Placer and State of California, have invented new and useful Improvements in Processes for Producing Wearing-Surfaces for Streets and Roads, of which the following is a specification.

10 The present invention relates to processes for producing wearing surfaces for streets and roads.

The object of my present application is to regulate the percentage of voids in the mineral matter used for the lower course of wearing surface, and also to permit the use of stone other than crusher run, as in many cases this may prove advantageous in reducing the cost of construction.

20 Generally speaking, the present process contemplates the laying of a composite wearing surface expeditiously at small cost of skilled direction, apparatus and material, whereby a composite surface is formed whose lower and upper courses will be intimately blended and bonded at the top of the lower course, the upper course being so laid and blended with the lower course as to form therewith one integral mass so that 30 slipping or separation of the courses by the action of traffic or of the elements is rendered impossible all with the use of materials which are readily obtainable, the wearing surface produced being, as it were, integral, firm, not subject to ready erosion and capable of standing great wear.

The accompanying drawing illustrates a wearing surface made by the present process.

As an instance of my method of procedure in such cases the following will suffice. Broken stone passing screen $1\frac{1}{2}$ inch gage and retained on screen of $\frac{3}{4}$ inch gage is mixed with sufficient sand or earthy material to reduce the voids to 22%-28% of the mass.

45 If deemed expedient, a small proportion of either or both hydraulic cement, or lime, slaked or unslaked, may be used. The stone and other materials are mixed with sufficient bituminous cementing medium to thoroughly coat all the particles. It is then dis-

produced by commingling either sand or crusher screenings or both, with sufficient bituminous cementing medium to coat all particles and form an agglutinated mass. If 60 considered desirable a small proportion of either or both hydraulic cement or lime slaked or unslaked may be added. As thus previously prepared this bituminous mixture is spread in thin coat C over the course B 65 and thereupon constitutes the upper course.

The third and last step of the process is subjecting the courses B and C to an initial pressure by a heavy roller or other suitable means, and thereby simultaneously compressing the upper and lower courses to the desired extent. The action of the roller passing to and fro over the fine mixture, disposed on the uncompacted layer of relatively coarse mixture is to readily force this fine mixture 7 into the interstices of the lower layer and at the same time to compress and compact the elements of that layer, and by so doing, bonding and blending the upper course C with the lower course B. The pressure, however, applied is the first pressure given to either of the courses and it results not only in a thorough compression of the respective courses, but also in an intimate blending and bonding of the respective courses, particularly in the upper part of the lower course B, thereby producing a composite surface which in structure and attributes is radically different from any multi-layer or stratified pavements because the courses B and C are, by the single compression referred to, made into one, substantially integral surface whose lower portion has the requisite durability, strength and rigidity, and whose upper portion or wearing surface is dense, impermeable and adapted to close or seal without tendency to ravel or separate.

I wish to call attention to the fact that no effort is made to fill the voids to repletion throughout the mass but to so regulate the voids in lower portions thereof that the resultant wearing surface while possessing sufficient rigidity in its lower portion to withstand traffic is less dense in the lower than in the upper portion of the mass.

The application of the top course C to

Witnesses:
 Albert C. Exalt
 Hugh M. Sterling

Inventor,
 Frederick A. Malette.
 By W. M. Stockbridge
 Atty.

ing the wearing surface of a pavement, which comprises (a) mixing together a relatively large volume of a coarse mineral aggregate composed of crushed stone of various sizes from $1\frac{1}{2}$ inches down to $\frac{1}{4}$ inch and a sufficient amount of finely crushed solid matter to regulate the voids in the mixture to within the limits of 22 to 28% by volume and with only a sufficient quantity of a bituminous cementing agent to coat all the pieces of said materials, therewith without filling the voids therein, thereafter (b) placing the same upon a suitable foundation, in amount sufficient to form a relatively deep loose lower layer, (c) producing a relatively small amount of a second mixture consisting essentially of finely crushed solid matter, sized to pass a screen having six meshes per linear inch and a bituminous cementing agent, and (d) loosely spreading said second mixture upon said loose lower layer, without previous compression of said lower layer, thereby producing a plurality of superposed loose layers; and finally (e) simultaneously compressing both the upper and lower layers by rolling the upper layer, whereby an intimate locking of the upper and lower layers is effected, and a single rigid layer, without joint or cleavage, and in which the lower portion consists largely of coarse mineral aggregate in which the interstices are not completely filled, and shading upward with a decrease in the amount of coarse particles, and an increase in the amount of fine particles, until the immediate upper surface of the layer consists substantially of fine mineral matter with bituminous cement, is produced.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

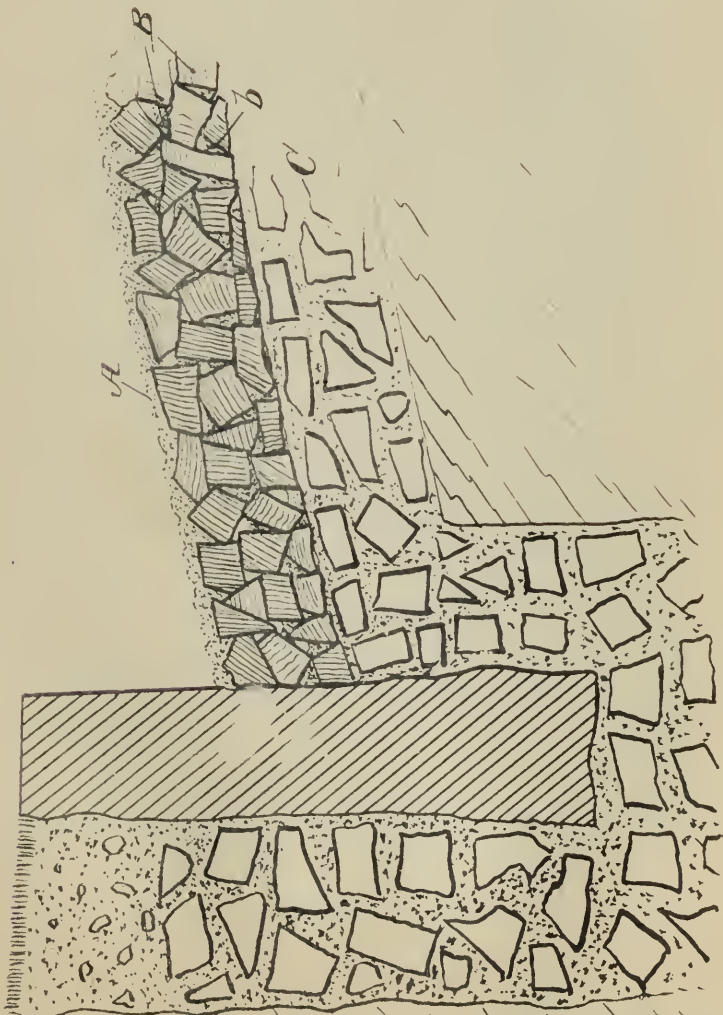
EDWIN C. WALLACE.

Witnesses:
A. M. PARKINS,
Wm. W. DEANE.

F. A. MALETTE.
ROADWAY.

Application filed Nov. 27, 1901.

(No Model.)



Witnesses,
Robert G. Pratt
Nugent M. Sterling

Inventor,
Frederick A. Malette.
By *Wm. Stockbridge*
Atty.

FREDERICK A. MALETTE, OF GENEVA, NEW YORK, ASSIGNOR OF ONE-HALF
TO EDWARD SEYBOLT, OF GENEVA, NEW YORK.

ROADWAY.

SPECIFICATION forming part of Letters Patent No. 691,708, dated January 21, 1902.

Application filed November 27, 1901. Serial No. 83,927. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK A. MALETTE, a citizen of the United States, residing at Geneva, Ontario county, New York, have invented certain new and useful Improvements in Roadways, of which the following is a specification.

My invention relates to roadways, and is in the nature of an improvement upon the construction described in Letters Patent No. 683,056, granted September 24, 1901, jointly to myself and Edward Seybolt.

The chief aim of this invention is to avoid the turning or rolling of the fragments of stone when subjected to heavy pressure after they have been individually coated with bituminous material and placed upon the foundation or bed; also, to provide a better top-dressing, which covers the protruding tops of the stones and fills the spaces between such tops and acts as the primary, though temporary, wearing-surface of the roadway.

In crushing stone in the large stone-crushing machines and, in fact, in any system of stone-crushing there is a percentage of small material consisting of stone-dust, stone-screenings, or small particles of stone. By actual test it has been ascertained that the use of a small amount of such material as it comes from the crusher when deposited in the voids will effectually prevent the fragments of the pavement from rolling, creeping, or sliding under heavy pressure. It is not necessary to use a sufficient quantity of this material to entirely fill the voids, thus adapting the small particles of stone to act as chocks or wedges which prevent the larger fragments from turning, shifting, and rolling out of position. Experience has also demonstrated that with respect to the surface-coat or top-dressing the best results are obtained by using tarred screenings or sand and the like placed loosely over the protruding tops of the stones and filling the spaces intervening between such protruding tops. When such dressing is quite thin, it wears away too rapidly between the stones and is productive of an irregular wearing-surface. Therefore the final coat of sand or tarred screenings, or both, is made of greater thickness, as compared with that de-

the result that the wear caused by the abrasion of vehicle-wheels eventually brings the stones to the surface with the spaces between the protruding tops completely filled, thus attaining a regular and practically continuous or unbroken wearing-surface of stone.

The accompanying drawing represents a sectional view of a roadway constructed in accordance with the present invention.

A designates the surface-coat or top-dressing constituting the initial temporary wearing-surface of the roadway; B, the layer composed of fragments of broken stone, the voids between which are partially filled with small particles of stone, screenings, or dust and indicated at *b*, and C the foundation or initial layer, which is placed directly upon the subgrade.

The foundation C may consist of concrete or any ordinary and well-known pavement-foundation material, or a combination of both, the composition of such foundation being immaterial to the present invention. Upon said foundation is placed the layer B of broken stone as it comes from the crusher, the said broken stone forming the ultimate wearing-surface of the roadway. The fragments of stone composing the layer B usually vary in size from one-quarter of an inch to two inches in diameter, enough of such material being employed to produce a layer of approximately three inches in thickness, the thickness, however, depending to a considerable extent upon the kind of traffic for which the roadway is designed.

The pieces or fragments of stone are primarily coated with bituminous material, such as coal-tar or other pitch, a sufficient quantity being used to merely coat the fragments on all sides without filling the voids after the fragments are laid on the foundation-layer and compressed. This coating causes the fragments to adhere firmly together and constitutes a complete and effective bond when the layer B is subjected to the pressure of a steam or other roller. The roller should be heavy enough to firmly press the stones together and materially reduce the voids, without, however, altogether filling them.

In order to guard against the liability of the

W. H. Clarke.

D

Inventors
Frederick A. Malette.
Edward Seybolt.
By Wm. M. Stoeckbridge
Atty.

I claim, and desire to secure by Letters Patent, is—

1. A roadway comprising a foundation, a layer of broken stone of varying sizes thereon forming the wearing-surface of the roadway, the fragments of stone being individually coated with bituminous material, which forms a bond between the fragments when the latter are subjected to pressure, and an anti-slipping filler of stone-dust, stone-screenings or the like partially filling the voids between the fragments and forming chocks which prevent the turning or rolling of the fragments under pressure.

2. A roadway comprising a foundation, a layer of broken stone of varying sizes thereon forming the wearing-surface of the roadway, the fragments of the stone being individually coated with bituminous material which forms a bond between the fragments when the latter are subjected to pressure, and an anti-slipping filler of stone-dust, stone-screenings or the like treated with bituminous material and partially filling the voids between the fragments, said filler acting as a chock to prevent the turning or rolling of the fragments under pressure.

3. A roadway comprising a foundation, a layer of broken stone of varying sizes thereon, the fragments of stone being individually coated with bituminous material which forms a bond between the fragments when the latter are subjected to pressure, a filler of stone-dust, stone-screenings or the like partially filling the voids between the fragments and acting as a chock to prevent the turning or rolling of the fragments under pressure, and a surface-coat or top-dressing of tarred screenings or sand covering the protruding tops of the fragments and filling the spaces between such tops.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

FREDERICK A. MALETTE.

Witnesses:
C. T. CHURCH,
W. S. WOOD.

pressure, resort is had to what may be termed an "antislipping" filler *b*, which is composed of the smaller particles of material coming from the crusher, and consisting of stone dust, screenings, and the like. A sufficient quantity of this is used to partially fill the voids and occupy the lower portions thereof. The filling material may be used just as it comes from the crusher, or it may be treated with bituminous material and partly or wholly coated therewith. When the filler is deposited in the voids, it works its way partly beneath the stones and acts to wedge the same firmly in position, so that the stones will not turn, shift, or roll after they have once settled firmly in place. The bitumen insures adherence of the particles of the filler to the underlying as well as the superposed fragments, resulting in a practically rigid and unyielding roadway well adapted to all kinds of traffic.

Upon the layer *B* is placed a surface-coat or top-dressing *A* of tarred stone-screenings or sand, or both, the same being laid loosely, so as to fill the spaces between the protruding tops of the stones and also cover the stones lightly. The effect of traffic is to force the surface-dressing firmly and compactly into the spaces referred to. Eventually the stones appear at the surface and in reality form the permanent wearing-surface of the roadway.

Ordinarily that portion of the top-dressing which covers the stones lasts but a few weeks, or at most a few months, and thereafter the finished roadway shows a stone top surface which is perfectly rigid.

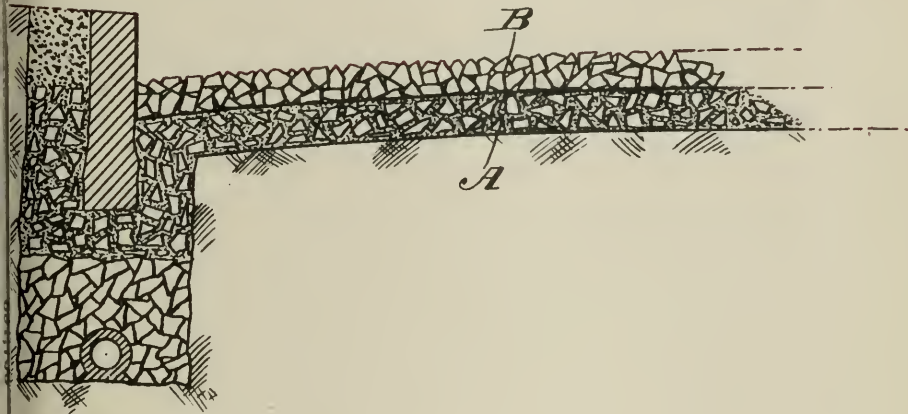
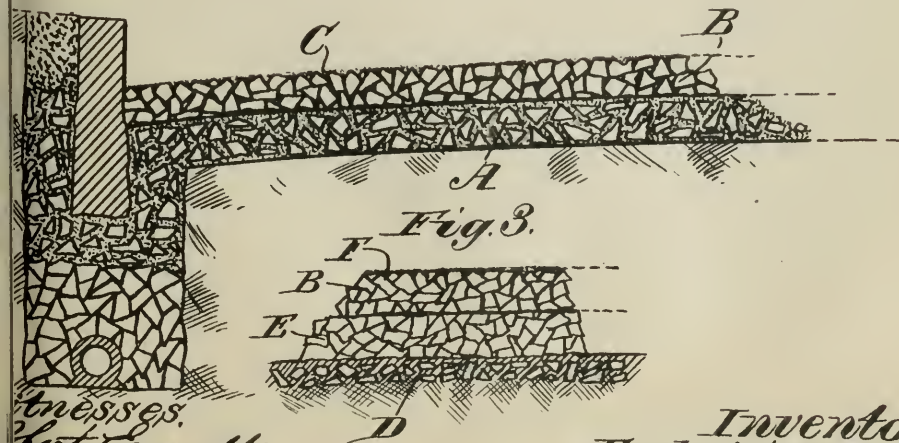
The stones when freshly coated with bitumen are oily and slippery and in many instances without the use of the filler and even when bonded together spread and shift themselves about under the pressure of a heavy roller. The filler serves to lock and wedge the stones against such movement. It is also important not to completely fill the voids, as too great a quantity of filler would form a yielding bed upon which the stones would roll and shift under pressure and prevent proper and effective bonding.

Having thus described my invention, what

F. A. MALETTE & E. SEYBOLT.
ROADWAY.

(Application filed July 1, 1901.)

(No Model.)

Fig. 1.*Fig. 2.*

Witnesses,
J. H. Goulet,
W. H. Clarke.

Inventors
Frederick A. Malette.
Edward Seybolt.
By *Wm. Stockbridge*
Atty.

UNITED STATES PATENT OFFICE.

FREDERICK A. MALETTE AND EDWARD SEYBOLT, OF GENEVA, NEW YORK.

ROADWAY.

SPECIFICATION forming part of Letters Patent No. 683,066, dated September 24, 1901.

Application filed July 1, 1901. Serial No. 66,700. (No model.)

To all whom it may concern:

Be it known that we, FREDERICK A. MALETTE and EDWARD SEYBOLT, citizens of the United States, residing at Geneva, Ontario county, New York, have invented certain new and useful Improvements in Roadways, of which the following is a specification.

Our invention is designed for the production of a rigid, permanent, and durable roadway, and the same resides in a novel construction of such a roadway and in the method of laying it.

The primary object of the invention is to produce a roadway in which the actual wearing or impact surface thereof is composed of stone or fragmentary portions thereof so closely associated, combined, and bonded together as to form a practically continuous, rigid, and waterproof surface.

In carrying out the invention each particular stone or fragment of stone is coated with bitumen, and the stones are thereafter placed upon and spread evenly over a previously-prepared foundation, which may be of any character. The whole is then subjected to compression, as by passing a heavy roller over the surface, to reduce the voids between the stones or fragments and to firmly bond said stones or fragments together by the adhesion of the bituminous coatings to each other. This produces a practically continuous stone surface, upon which a top dressing or supplemental coating may be subsequently applied, the same consisting, preferably, of coal-tar or other pitch having combined therewith sand or stone screenings. This top dressing is not intended to provide a completed or finished surface for the roadway, but merely to smooth up the wearing-surface thereof by filling the interstices and small voids at the immediate surface of the roadway without filling the voids which occur beneath the surface of the stones of which the superimposed layer is composed. The layer of broken stone referred to eventually forms the wearing-surface of the roadway, which takes the weight of the traffic, the abrasion

method of laying the same, as hereinafter fully described and claimed.

In the accompanying drawings, Figure 1 is a sectional view of a portion of a roadway, illustrating the improved construction. Figure 2 is a similar view showing the top dressing or smoothing course applied. Figure 3 is a similar view of a modified construction.

Similar letters of reference designate corresponding parts in all figures.

In carrying out the invention we first lay a suitable foundation A, which may consist of concrete or any other pavement-foundation material now in use, or a combination of concrete and such other pavement-foundation material. After the foundation has been completed a layer B of broken stone is placed thereon, which constitutes the wearing-surface of the roadway. The fragments or pieces of stone of which this wearing-surface is composed vary in size from one-quarter of an inch to two inches in diameter, or, in other words, they are of such sizes as will pass through screens having from a quarter-inch mesh to a two-and-a-half-inch mesh. The layer of broken stone may be of any desired thickness, according to the character of traffic, a thickness of three inches being sufficient for all ordinary purposes.

The pieces or fragments of stone of which the wearing-surface is composed are primarily coated with coal-tar or other pitch of a quantity not sufficient to fill the voids or spaces between the same after they are laid and compressed, but sufficient to make said pieces or fragments adhere firmly together, so as to form a complete and effective bond when the layer of stone is subjected to the pressure of a steam or other roller. In order to coat the pieces of stone, they are preferably placed in a suitable mixer and stirred indiscriminately until all of the fragments are thoroughly coated. They are then evenly spread upon the foundation and rolled. They are then pressed together and thoroughly compacted by a steam-roller or otherwise in order to reduce as far as possible, but not entirely fill the voids and open spaces between

the claim itself, must be read as a claim for a pave-

unyielding stone wearing-surface is provided adapted to withstand the impact and abrasive effect of the wheels of vehicles passing thereover.

5 In order to smooth up the exposed surface of the roadway after the stones have been thoroughly rolled and compressed, as above stated, resort may be had to a thin dressing or surfacing of pitch combined with sand or 10 stone screenings, or both. Only a sufficient amount of such material is deposited upon the surface of the roadway to fill in the interstices or shallow voids at the immediate surface of the road-bed. This is not an essential feature of the present invention, but 15 is merely resorted to in order to give a finish and assist in making the wearing-surface waterproof. Such surfacing coat or dressing is designated by the reference-letter C.

20 By the improvement described instead of the soft and flexible surface such as exists in the ordinary tar macadam roadways or pavements now in use in this and other countries a solid and substantial structure is produced which provides a water-tight wearing-surface that will not melt or be picked up by 25 the calks of horses' shoes or the wheels of vehicles, but which will bring directly upon the stone of the wearing-surface the abrasion of the wheels and take all the wear of the roadway traffic, the idea of the invention being to form a stone roadway of fragments of 30 stone of various sizes cemented together by a bituminous coating and bonded by compression. We do away entirely with the indiscriminate fillings which are usually placed in the voids between the pieces of stone, which fillings in the usual structure of a macadam 35 roadway form cushions on which the particles of stone may roll and shift, thus causing a rapid deterioration of the roadway. We propose to coat the pieces of stone with pure bitumen unmixd with sand and pulverized limestone or hydraulic cement and also to 45 roll or compress the stone before applying the final dressing or finishing-coat of asphalt or bituminous composition, the latter, as previously stated, being only sufficient to smooth off and fill up any uneven places in the wearing-surface.

50 The construction illustrated in Fig. 3, while involving the same principle as that illustrated in Figs. 1 and 2 and above described, differs therefrom in one or two details. In 55 the roadway of Fig. 3 the base or foundation consists of a finished macadam road. This foundation embodies a two-inch layer D of broken stone, the same being rolled in a loose condition into the surface of the soil for the 60 purpose of equalizing the foundation or of making it hard and of the same general character throughout. The stone may be rolled

roller. After the layer D has been prepared in this manner we place upon the same a preferably four-inch layer E of broken stone 70 and stone screenings, the said stone and screenings being laid loosely to a depth of about five inches and subsequently compressed to approximately four inches. The layers D and E constitute a complete macadam roadway and serve as the support for the stone roadway B, which is formed and laid in the same manner as the layer B of 75 Figs. 1 and 2 and above described. The screenings of the layer E are spread equally and evenly, and by flushing and rolling they are caused to fill the voids in the macadam roadway. On top of the stone roadway or 80 layer B is placed a finishing layer F of limestone screenings or fine gravel, or both, without any coating of pitch or bitumen. This 85 last layer or surfacing is rolled on top of the layer B and serves to equalize and render uniform the finished surface of the roadway, a sufficient amount of the limestone screenings or fine gravel, or both, being employed to make and constitute a superficial impact or 90 wearing-surface for the roadway. I y reason of the bitumen coating of the stones comprising the layer B the last and finishing layer of screenings or gravel, or both, will adhere firmly to the stone when subjected to the compressing action of a heavy steam-roller.

Having now described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. A roadway comprising a foundation and a layer of broken stone of varying sizes thereon, the fragments of stone being individually coated with bituminous material, which, when the same are subjected to pressure, forms a bond, and the tops of the upper of said stones protruding above said bond to form a wearing-surface of stone.

2. A roadway comprising a foundation, a wearing-surface thereon consisting of broken stone of varying sizes, the fragments of stone being individually coated with bituminous material, which when the same are subjected to pressure, forms a bond and produces a rigid and unyielding wearing-surface of stone, with the voids or spaces between said stones being unfilled, and a top dressing laid between the protruding tops of said stones for smoothing the wearing-surface of the roadway without covering the tops of the stones.

3. A roadway comprising a foundation, a wearing-surface thereon consisting of broken stone of varying sizes, the fragments of stone being individually coated with bituminous material, which, when the fragments are subjected to pressure, forms a bond and produces a rigid and unyielding wearing-surface of stone, and a top dressing of pitch mixed with

6. The method of laying a roadway, which consists in preparing a suitable foundation, spreading evenly thereon a layer of broken stone, the fragments of which have been previously coated with bituminous material, then subjecting the same to compression to reduce the size of the voids and bond the fragments together, and finally adding a top dressing of pitch combined with sand or stone screenings to fill the interstices between the protruding tops of the stones and smooth off the surface without covering the tops of the stones.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

FREDERICK A. MALETTE.
EDWARD SEYBOLT.

Witnesses:

I. V. TRAINOR,
J. G. FARWELL.

consists in preparing a suitable foundation, spreading evenly thereon a layer of broken stone coated with bituminous material, and then subjecting the same to compression to reduce the size of the voids and bond the fragments of stone together, the tops of the upper stones of said layer protruding above the bond and forming the wearing-surface of the roadway.

The method of laying a roadway, which consists in preparing a suitable foundation, spreading evenly thereon a layer of broken stone, the fragments of which have been previously coated with bituminous material, then subjecting the same to compression to reduce the size of the voids and bond the fragments together, the voids remaining unfilled, and finally adding a top dressing to fill the interstices between the protruding tops of the stone and smooth off the surface without covering the tops of the stones.

ess, in the light of the specifications and in the light of the claim itself, must be read as a claim for a pave-

[TITLE OF COURT AND CAUSE.]

Messrs. Paul S. Honberger of Los Angeles, Cal., and J. M. Head of Boston, Mass., and O. L. Evarts of Fresno, Cal., attorneys for Plaintiff.

Messrs. Lyon & Lyon of Los Angeles, Cal., Special Patent Counsel and Bertrand W. Gearhart, District Attorney and Ray C. Wakefield, Deputy District Attorney of Fresno County, Attorneys for Defendants.

MEMORANDUM OPINION.

Bledsoe, District Judge:- In this case, I have given very careful study to the numerous and rather lengthy briefs filed by respective counsel herein. So also, I have endeavored to familiarize myself with the prior art involved in the paving business. The patent sued upon No. 959976 in view of the prior art and particularly in view of the prior art as exhibited by patent No. 727505, granted May 5, 1903, is to be rather narrowly construed. In other words, within the limitations then existing, there was not much left for the patentee to patent and this is peculiarly apposite in view of the specifications in patent No. 727505 to the effect that the pavement therein provided for "may be covered, if desired, with relatively thin surfacing of clear asphalt-cement or an asphalt or bituminous composition of any desired nature. In some instances there may be rolled into this thin surfacing while it is yet soft sufficient sand, gravel, or fine stone to prevent its displacement by traffic."

The first claim of plaintiff's patent being for a process, in the light of the specifications and in the light of the claim itself, must be read as a claim for a pave-

ment consisting of an upper layer laid upon a lower layer without any intermediate compression of the lower layer. Obviously, this claim was not infringed by defendant's structure unless it may be said by the court that the laying of the upper layer of defendants' pavement after the preliminary rolling with the twelve ton roller, was merely the substantial equivalent of the laying of the pavement without any preliminary rolling of the first course at all. This, the court, from an inspection of the pavement laid, no less than from a consideration of the process actually followed, cannot find to be the fact.

The second claim of the plaintiff's patent, is for a product. Read in the light of the specifications it is for a product laid in pursuance of the process indicated in the patent. I understand the law to be, however, that a product having definite characteristics by which it may be identified and which distinguish it from the process by which it was produced, may be properly described by such characteristics and when so claimed and described, the claim will not be limited to the process specified. Walker on Patents, Sec. 106. Construed in the light of this principle, I am persuaded that the second claim is not to be limited by the precise process specified in the patent. It does, however, specify a product or pavement composed of two courses, the upper course disposed on the lower course, and made up of finely divided mineral matter mixed with sufficient bituminous binding material to thoroughly coat all of the particles "and blended with the coarse mixture at the top of the mass." Construed in the light of the specifications, as the court should construe

any claim of a patent, (Walker on Patents, Sec. 182) the requirement that the upper course shall be "blended" with the lower course, is to be read in the light of the specification that the two courses were to be laid one upon the other without any intermediate rolling. In truth and in fact, in this wise only could there be a composite blended course.

I am persuaded from a consideration of all of the facts involved, including an inspection of the pavement produced by the defendants, that the two courses of the pavement produced by them were and are not blended within the meaning of that term as used in plaintiff's patent. In my judgment, therefore, there is no infringement of plaintiff's patent shown by the product of defendants. The specifications employed by the defendants do not infringe the first claim of the patent for the reasons heretofore suggested.

The real contention of plaintiff seems to be that its patent is infringed if an upper course of a pavement be laid upon a lower course of the same while the lower course is yet in a hot or plastic condition, irrespective of whether it is rolled intermediately or not. In view of the prior art I cannot conclude that plaintiff is entitled to have its patent thus construed, because the patent No. 727505 issued to Warren in 1903 and which expired before defendants' structure was produced, as hereinbefore referred to, indicated the laying of a "bituminous composition of any desired nature" upon an undercourse and the rolling into this "while it is yet soft" of sand, gravel or fine stone. This contribution to the art, in my judgment, negatives now the

broad claim which plaintiff seeks to have injected into his patent.

The usual decree of dismissal will be entered.

May 29, 1922.

[Endorsed]: Filed May 29, 1922. Chas. N. Williams, Clerk. By Douglas Van Dyke, Deputy.

[TITLE OF COURT AND CAUSE.]

Messrs. Paul S. Honberger of Los Angeles, Cal., and J. M. Head of Boston, Mass., and O. L. Evarts of Fresno, Cal., attorneys for plaintiff.

Messrs. Lyon & Lyon of Los Angeles, Cal., Special Patent Counsel and Bertrand W. Gearhart, District Attorney and Ray C. Wakefield, Deputy District Attorney of Fresno County, Attorneys for Defendants.

MEMORANDUM OPINION.

Bledsoe, District Judge:- Pursuant to the opinion of the court filed herein on the 29th day of May and in accordance with the usual practice obtaining, a decree of dismissal based upon non-infringement by defendants was prepared by the clerk and submitted to the court for its signature and being filed was duly entered. It is simple in form and merely orders, adjudges and decrees that the above entitled cause "be and the same is dismissed with costs in favor of Defendant taxed at ——— dollars." An informal motion has been made that this decree be vacated and that a decree ordering, adjudging and decreeing plaintiff's patent to be valid and not anticipated be entered as a part of the decree of dismissal.

Defendants, in their answer, among other defenses, asserted the invalidity of plaintiff's patent. Evidence relevant to that issue was introduced by both parties. If the court had been impressed with any want of validity on the part of plaintiff's patent, it would have so found and caused its decree to be entered accordingly. It was my judgment, however, that the presumption of validity inherently attaching to the patent was in no sense overcome. In the absence of an adverse finding, that presumption still continues and plaintiff really needs no judgment or decree buttressing or adding to the presumed validity of the grant from the government. Assuming its validity, therefore, and giving to it, as such, the construction to which it was entitled, the court found and held that it had in no wise been infringed by defendants' process or product. This being the thing really decided by the court, this, therefore, was obviously the thing to be decreed by the court. In so doing, the court feels that it was acting in accordance with established procedure.

Certain precedents have been cited where the validity of the patent in issue has been favorably passed upon and adjudged by the court, although judgment went for the defendant because of non-infringement. Judge Trippet of this court, however, is of the belief that under the circumstances here obtaining, the decree should be based upon noninfringement and without especially decreeing the validity of the patent. The reason for his conclusion is that otherwise possibly a strong plea for the issuance of an injunction in advance of trial, based upon a judicially decreed validity

of the patent, might be made and that it would be unwise to make that possible as the result of a case where the decree of the court, favorable to the patent, might go unchallenged through defendant's disinclination to appeal in a case, as to him, entirely moot in its nature. Along the same lines, Walker on Patents, 5th Ed. Sec. 649 says:

"Where more than one of those defenses is strongly supported in the record, it is proper for the court to confine the decision to any one of them that is judicially found to be sound. Where the defense of noninfringement is thus found, it is proper and generally preferable to select that defense as the one upon which to base the decision for the defendant. The reason for this preference, is the consideration that the question of the validity of a patent ought not to be adjudicated in the affirmative, in a case where the defendant, by reason of noninfringement thereof, has no adequate motive to hunt upon and lay before the court, all the facts which relate to that question."

The propriety of the proposed decree being at best a doubtful matter, I am disposed to follow the suggestion of my colleague and the authority of the text book referred to.

The motion therefore is denied.

July 5, 1922.

[Endorsed]: FILED JUL 5 1902 CHAS. N. WILLIAMS, Clerk By Douglas Van Dyke, Deputy

[TITLE OF COURT AND CAUSE.]

PETITION FOR APPEAL.

The plaintiff, being aggrieved by the decree dismissing the bill of complaint herein entered by this Court on or about June 1, 1922, hereby appeals from said decree to the United States Circuit Court of Appeals for the Ninth Circuit, and prays that this appeal may be allowed and that a citation may be issued directed to the defendants, commanding them to appear before said United States Circuit Court of Appeals for the Ninth Circuit to do and receive what may appertain to justice to be done in the premises; and that a transcript of the record, proceedings, evidence and opinion in said cause, duly authenticated, may be sent to said United States Circuit Court of Appeals for the Ninth Circuit; and that the said decree of this Court be reversed, and such decree made as to said United States Circuit Court of Appeals shall seem meet and just.

WARREN BROTHERS COMPANY,

By J M Head, O L Everts & Paul S. Honberger
Solicitors.

[Endorsed]: FILED NOV. 23 1922 CHAS. N.
WILLIAMS, Clerk By R S Zimmerman Deputy

[TITLE OF COURT AND CAUSE.]

ORDER ALLOWING APPEAL.

In the above entitled cause the defendants having filed their petition for an order allowing an appeal from a decree dismissing the bill of complaint herein entered by this court on or about June 1, 1922, together with assignments of error:

Now upon motion of Messrs. J. M. Head, O. L. Everts, and Paul S. Honberger, solicitors for plaintiff, it is ordered that said appeal be and hereby is allowed to plaintiff, to the United States Circuit Court of Appeals for the Ninth Circuit, from said decree dismissing the bill of complaint herein, entered by this court on or about June 1, 1922, and that the amount of plaintiff's bond on said appeal be, and the same is hereby, fixed at the sum of Two hundred and fifty dollars (\$250.)

IT IS FURTHER ORDERED, that upon the filing of such security a certified transcript of the record and proceedings herein be forthwith transmitted to the said United States Circuit Court of Appeals for the Ninth Circuit in accordance with the rules in equity by the Supreme Court of the United States promulgated, and in accordance with the statutes made and provided, together with the exhibits on file in this case or duly certified copies thereof.

Dated November 23rd 1922.

Bledsoe
Judge.

[Endorsed]: FILED NOV 23 1922 CHAS. N.
WILLIAMS, Clerk By R S Zimmerman Deputy

[TITLE OF COURT AND CAUSE.]

ASSIGNMENT OF ERRORS.

Now comes the plaintiff and says that in the final decree entered in this case on or about June 1, 1922, there is believed to be manifest error, and for errors it assigns the following:-

1. The court erred in holding the patent in suit to Wallace No. 959,976 not infringed.

2. The court erred in not holding said Wallace patent to have been infringed by the defendants and each of them.

3. The court erred in failing to include in said decree the holding that said Wallace patent is valid as stated in the court's opinion.

4. The court erred in refusing to order an injunction and accounting of profits and damages under said patent against the defendants and each of them.

5. The court erred in ordering that the bill of complaint be dismissed.

6. The court erred in ordering that the defendants recover costs.

7. The court erred in not holding that the plaintiff recover costs.

8. The court erred in holding that said Wallace patent "is to be rather narrowly construed."

9. The court erred in holding that in view of patent 727,505 and other prior art, "there was not much left for the patentee (Wallace) to patent."

10. The court erred in holding that the second claim of said Wallace patent is limited to a pavement in which the two courses are "laid one upon the other without any intermediate rolling."

11. The court erred in holding that a "composite blended course" could only be produced where two layers were laid "one upon the other without any intermediate rolling."

12. The court erred in holding that the two courses

of the pavement laid by the defendants were not blended, within the meaning of that term as used in said Wallace patent.

13. The court erred in holding that said Wallace patent cannot cover a pavement in which an upper course is laid upon a lower course while the lower course is yet in a hot or plastic condition, if there be any intermediate rolling of the lower course.

14. The court erred in holding that the prior art, and particularly Warren patent 727,505, compelled the narrow construction of the claims of said patent to Wallace adopted by the court.

WHEREFORE the plaintiff prays that said decree be reversed with instructions to enter a decree ordering an injunction and accounting, with costs to the plaintiff.

WARREN BROTHERS COMPANY,

By J M. Head, O. L. Everts & Paul S. Honberger
Solicitors.

[Endorsed]: FILED NOV 23 1922 CHAS. N.
WILLIAMS, Clerk By R S Zimmerman Deputy

[TITLE OF COURT AND CAUSE.]

BOND ON APPEAL.

KNOW ALL MEN BY THESE PRESENTS:
That the United States Fidelity and Guaranty Company, a corporation of the state of Maryland duly authorized to transact surety business in the state of California is held and firmly bound unto C. M. Thompson, O. M. Thompson, E. O. Thompson, co-partners

doing business under the firm name of Thompson Brothers, H. B. Vogel, J. B. Hill, and the County of Fresno, a body politic and corporate of the state of California, defendants in the above entitled suit, in the penal sum of Two hundred fifty dollars (\$250) to be paid to said defendants, their heirs and assigns, which payment well and truly to be made the United States Fidelity and Guaranty Company binds itself, its successors and assigns, firmly by these presents.

Sealed with the corporate seal and dated this 22nd day of November, 1922.

The condition of the above obligation is such that whereas the said plaintiff, Warren Brothers Company, a corporation, of the above entitled suit is about to take an appeal to the United States Circuit Court of Appeals for the Ninth Circuit to reverse an order or decree made, rendered, and entered on the first day of June, 1922, by the District Court of the United States for the Southern District of California, Southern Division, in the above entitled cause, by which said action was dismissed with costs to said defendants:

NOW THEREFORE, the condition of the above obligation is such that if the said Warren Brothers Company, a corporation, shall prosecute its said appeal to effect an answer all damages and costs, if they shall fail to make good their appeal, then this obligation to be void; otherwise to remain in full force and effect.

IN WITNESS WHEREOF, the seal and signature of said principal is hereunto affixed and the corporate name of said surety is hereto affixed and attested by

its duly authorized attorneys in fact at Los Angeles, California, this 22nd day of November, 1922.

UNITED STATES FIDELITY AND
GUARANTY COMPANY,

By W. H. Schroder (SEAL)
Attorney in fact.

WARREN BROTHERS COMPANY,

By F. M. Shallue
California Manager.

STATE OF CALIFORNIA)
)SS
COUNTY OF Los Angeles)

On this 22nd day of November, in the year one thousand nine hundred and Twenty-two, before me, J. St. Paul White, a Notary Public in and for said County and State, residing therein, duly commissioned and sworn, personally appeared W. H. Schroder, known to me to be the duly authorized Attorney-in-fact of the UNITED STATES FIDELITY AND GUARANTY COMPANY, and the same person whose name is subscribed to the within instrument as the Attorney-in-fact of said Company, and the said W. H. Schroder duly acknowledged to me that he subscribed the name of the UNITED STATES FIDELITY AND GUARANTY COMPANY thereto as Surety and his own name as Attorney-in-fact.

In Witness Whereof, I have hereunto set my hand and affixed my official seal the day and year in this certificate first above written.

J St Paul White
Notary Public in and for Los Angeles County, State
of California. (SEAL)

Examined and recommended for approval as provided in Rule 29.

Paul S. Honberger
ATTORNEY.

I hereby approve the foregoing bond.

Dated the 23rd day of Nov 1922

Bledsoe

Judge

[Endorsed]: FILED NOV 23 1922 CHAS. N.
WILLIAMS, Clerk By R S Zimmerman Deputy

[TITLE OF COURT AND CAUSE.]

STIPULATION AS TO TRANSCRIPT OF RECORD ON APPEAL AND EXHIBITS.

The plaintiff having taken appeal in this suit, to the United States Circuit Court of Appeals for the Ninth Circuit. from the Decree of Dismissal, June 1, 1922.

IT IS HEREBY STIPULATED AND AGREED:

Both parties to this suit so desiring, the provisions of Equity Rules 75, 76 and 77, excepting the second paragraph of Rule 76, promulgated by the United States Supreme Court, applicable to appeals, are hereby waived; that the testimony in this cause be reproduced for the transcript in question and answer form, to preserve the exact form and substance of the same; that the record on appeal in this cause shall include a true and correct copy of the following papers and records in this cause on file in the office of the Clerk of this Court, to-wit:

Bill of Complaint, with Exhibits, 1, 2, 3 and 4 attached thereto, together with the following de-

scribed portions of the contract and specifications constituting Exhibit 5 attached thereto, to-wit:

Title page.

Pages 3 to 7, to the heading "Section 3, Earth Work Grading".

Pages 14, 15, 15a, 16a, 16b, 16c, 17, 17a.

Pages 32, 33, 34, 35 and 37.

Answer.

Petition of County of Fresno for leave to intervene.

Petition that testimony of plaintiff's expert witnesses be set forth in affidavits, and notice thereof.

Order allowing intervention.

Order that testimony of expert witnesses be filed in affidavit form.

Petition that an extension of time in which to file testimony of plaintiff's expert witnesses be granted and notice thereof.

Order granting extension.

Stipulation granting extension of time for filing affidavit of James W. Howard.

Affidavits for plaintiff of Edwin C. Wallace, George H. Perkins, (together with Exhibits A, B, C, D and E attached to Perkins affidavit), and James W. Howard. Affidavits for defendants of Elmer O. Slater, Harry E. Leyden, and Chris P. Jensen (together with Exhibits C, D, G, and H, attached to Jensen affidavit.

Stipulation dated September 7, 1921, relating to introduction of certain exhibits and also stipulating certain fact.

Depositions for plaintiff of Charles S. Ashley (with Exhibits 1 and 2 attached thereto), Jacob A. Courtrade

(with attached Exhibits 1 and 2), and Arthur A. Adams.

The reporter's transcript of testimony and proceedings on trial, excepting and omitting therefrom the following:

Omit page 1, line 4, to page 1 line 16, and insert: "Mr. Head for plaintiff read following statement of plaintiff's case" (copy said statement).

Omit page 1, line 17, to page 4, line 9 and insert: "It was stipulated and admitted in evidence that plaintiff was a corporation organized under the laws of the state of West Virginia; that copies of United States patents may be introduced without certificates; that file wrapper of patent in suit, duly certified, be admitted in evidence, marked: 'Plaintiff' Exhibit No. 1.' "

Omit page 42, line 24, to page 45, line 3.

Omit page 65, line 6 to page 66, line 3.

Omit page 68, line 6, to page 68, line 15, and insert: "Patent No. 691,708 to Mallette, and No. 683506 To Mallette and Seyboldt, offered and admitted as defendants' Exhibits M-12 and M-13.

Omit page 200, line 1, to page 209, line 5.

Plaintiff's Exhibit 6. File wrapper of patent in suit.

Plaintiff's Exhibit 7. Letters.

Plaintiff's Exhibit 8. Statement of yardage.

Plaintiff's Exhibit 9. Photograph.

Plaintiff's Exhibit 20. Photograph.

- Plaintiff's Exhibit 21. Photograph.
- Plaintiff's Exhibit 22. Small photograph.
- Plaintiff's Exhibit 23. Picture.
- Plaintiff's Exhibit 24. Picture.
- Plaintiff's Exhibit 25. Photograph.
- Plaintiff's Exhibit 26. Photograph.
- Plaintiff's Exhibit 36. Picture.
- Plaintiff's Exhibit 37. Photograph.
- Plaintiff's Exhibit 38. Photograph.
- Plaintiff's Exhibit 39. Photograph.
- Plaintiff's Exhibit 40. Photograph.
- Plaintiff's Exhibit 41. Photograph.

Plaintiff's Exhibits 1 to 5 inclusive, being attached to the bill of complaint and to be printed therewith, need not be printed a second time.

- Defendant's Exhibit M-1. Cranford patent 88,139.
- Defendants' Exhibit M-2. DeSmedt patent 375,273.
- Defendants' Exhibit M-3. Barber patent 391,222.
- Defendants' Exhibit M-4. Warren patent 727,506.
- Defendants' Exhibit M-5. Boulton patent 17,483.
- Defendants' Exhibit M-6. Warren patent 675,430.
- Defendants' Exhibit M-7. Wilson patent 748,248.
- Defendants' Exhibit M-8. Schutte patent 768,699.
- Defendants' Exhibit M-9. Amies patent 932,941.
- Defendants' Exhibit M-10. Wallace patent 1,183,057.
- Defendants' Exhibit M-12. Mallette patent 691,708.
- Defendants' Exhibit M-13. Mallette, et al, patent 683,506.

The opinion of the Court rendered on or about May 29, 1922.

Final Decree entered June 1, 1922.

Memorandum opinion of the Court dated July 5, 1922, and order thereon entered July 5, 1922.

Petition for Appeal, and Order allowing same.

Assignment of Errors.

Appeal Bond.

Citation on appeal.

Stipulations and Orders extending time to file, record and docket cause.

This stipulation as to Transcript of Record on Appeal and Exhibits.

Praecipe for Transcript of Record.

That the Clerk of the District Court shall certify the following physical exhibits and original briefs filed herein, to the Circuit Court of Appeals, the same being part of this record:

The original Briefs filed herein, to-wit: Plaintiff's Opening Brief, Defendants' Brief, Plaintiff's Reply Brief, and Defendants Reply Brief.

Exhibits A, B, E and F, accompanying and referred to in affidavit of Chris P. Jensen.

Plaintiff's Exhibits as follows:

10) Samples from which photos were taken

11)

12)

13 - Sieves

14 - Box and contents

15 - Glasses

16 - Tubes

17 - Sample of pavement laid by Thompson Bros. on Blackstone Ave., received through Mr. Burdge.

18 - Sample cut into three or four pieces.

- 19 - Sample with four layers.
- 27 - Piece of pavement laid under Type A.
Specifications.
- 28 - Piece of pavement, "211" Type A.
- 29 - Piece of pavement, marked "215",
- 30 - Piece of pavement, marked "320",
- 31 - Piece of pavement, marked "33",
- 32 - Piece of pavement, marked "34",
- 33 - Piece of pavement, marked "35",
- 34 - Piece of pavement, marked "36",
- 35 - Piece of pavement, marked "38",
- 42-48-Samples of pieces from Brough taken
from Type B pavement.

Defendants' Exhibits H - Chalk specimen.

Plaintiff's Exhibits No. 49, 1903 Edition of Richardson's Book.

Defendants' Exhibit M-11, "The Modern Asphalt Pavement" by Richardson.

IT IS FURTHER UNDERSTOOD AND AGREED.

That the captions of all pleadings and papers filed in this suit, except the Bill of Complaint and the Petition to Intervene, - the captions of which shall be printed in full - shall be omitted from the printed record on appeal herein to the Circuit Court of Appeals for the Ninth Circuit; and that all other than these excepted pleadings and papers shall be headed with only a statement of their respective nature, or purpose or subject and the caption ("TITLE OF COURT AND CAUSE)"; that all attorneys cards on all pleadings and papers, and all endorsements on the backs of covers of all pleadings and papers, except,

however, endorsements showing the service and filing thereon, shall be omitted from the said printed record.

J M Head

O L Everts

Paul S. Honberger

Solicitors for Plaintiff and Appellant.

Lyon & Lyon

Leonard S. Lyon 2/5/23

Solicitors for Defendants and Appellee.

It is so ordered this 6 day of February, 1923.

Bledsoe

District Judge.

[Endorsed]: FILED FEB 6 1923 CHAS. N.
WILLIAMS, Clerk By W. J. Tufts, Deputy.

IN THE DISTRICT COURT OF THE UNITED
STATES, IN AND FOR THE SOUTHERN
DISTRICT OF CALIFORNIA.

WARREN BROTHERS COMPANY,)

Plaintiff and Appellant, (

vs

) In Equity F-1

C. M. THOMPSON, O. M. THOMP-

SON, E. C. THOMPSON, Co-part-)

ners, doing business under the firm (

name and style of THOMPSON)

BROTHERS, H. E. VOGEL and (

J. B. HILL.)

Defendants and Appellee. (

STIPULATION AS TO TRANSCRIPT OF
RECORD ON APPEAL AND EXHIBITS
-CORRECTING FORMER STIPULATION.

Plaintiff having taken an appeal in this suit to the
United States Circuit Court of Appeals for the Ninth

Circuit, from the Decree of Dismissal, June 1, 1922, and a Stipulation as to Transcript of Record having been heretofore filed and ordered.

NOW, THEREFORE, IT IS HEREBY STIPULATED AND AGREED:

Both parties so desiring that the STIPULATION AS TO TRANSCRIPT OF RECORD ON APPEAL AND EXHIBITS heretofore ordered on the 6th day of February, 1923, by the above entitled court, be corrected and amended as follows:

That Page 3, line 25 reading as follows:

"Defendants' Exhibit M-13, Mallette, et al, patent 683,506", be changed to read as follows:

"Defendants' Exhibit M-13, Mallette, et al, patent #683,056, dated September 24th, 1901, Serial Number 66,700."

That page 3, line 17 reading as follows:

"Defendants' Exhibit M-4 Warren Patent 727,506", be changed to read as follows:

"Defendants' Exhibit M-4 Warren Patent 727,505, dated May 5, 1903, Serial Number 60,450."

That page 3, line 18 reading as follows:

"Defendants Exhibit M-5 Boulton Patent 17,483", be changed to read as follows:

“Defendants Exhibit M-5 Boulton Patent 17,483 dated December 20, 1887.

J. M. Head

O L. Everts

Paul S. Honberger

Solicitors for Plaintiff and Appellant.

Frederick S Lyon

Leonard S Lyon

Ray C. Wakefield

Solicitors for Defendants and Appellees

It is so ordered this 5th day of March 1923.

Bledsoe

United States District Judge,
Southern District of California.

[Endorsed]: Filed Apr 7 1923 Chas N Williams,
Clerk By W J Tufts. Deputy Clerk

IN THE DISTRICT COURT OF THE UNITED
STATES, SOUTHERN DISTRICT OF
CALIFORNIA, SOUTHERN
DIVISION.

WARREN BROTHERS COMPANY,)
Plaintiff and Appellant, ()
vs.) In Equity F-1
C. M. THOMPSON, O. M. THOMP- ()
SON, E. C. THOMPSON, Co-part-)
ners, doing business under the firm ()
name and style of THOMPSON)
BROTHERS, H. E. VOGEL and ()
J. B. HILL.)
Defendants and Appellee. ()

I, CHAS. N. WILLIAMS, Clerk of the United States District Court for the Southern District of California, do hereby certify the foregoing volume containing 521 pages. numbered from 1 to 521 inclusive, to be the Transcript of Record on Appeal in the above entitled cause, as printed by Appellant and presented to me for comparison and certification, and that the same has been compared and corrected by me and contains a full, true and correct copy of the Bill of Complaint, with Exhibits, 1, 2, 3 and 4 attached thereto, together with the following described portions of the contract and specifications constituting Exhibits 5 attached thereto, to-wit:

Title page.

Pages 3 to 7, to the heading "Section 3, Earth Work Grading"

Pages 14, 15, 15a, 16a, 16b, 16c, 17, 17a.

Pages 32, 33, 34, 35 and 37.

Answer.

Petition of County of Fresno for leave to intervene.

Petition that testimony of plaintiff's expert witnesses be set forth in affidavits, and notice thereof.

Order allowing intervention.

Order that testimony of expert witnesses be filed in affidavit form.

Petition that an extension of time in which to file testimony of plaintiff's expert witnesses be granted and notice thereof.

Order granting extension.

Stipulation granting extension of time for filing *affidavit* of James W. Howard,

Affidavits for plaintiff Edwin C. Wallace, George H. Perkins, (together with Exhibits A, B, C, D and E attached to Perkins affidavit), and James W. Howard.

Affidavits for defendants for Elmer O. Slater, Harry E. Leyden, and Chris P. Jensen (together with Exhibits C, D, G, and H, attached to Jensen affidavit).

Stipulation dated September 7, 1921, relating to introduction of certain exhibits and also stipulating certain fact.

Depositions for plaintiff of Charles S. Ashley (with Exhibits 1 and 2 attached thereto), Jacob A. Courtrade (with attached Exhibits 1 and 2), and Arthur A. Adams.

The reporter's transcript of testimony and proceedings on trial, excepting and omitting therefrom the following:

Omit page 1, line 4, to page 1 line 16, and insert:

"Mr. Head for plaintiff read following statement of plaintiff's case" (copy said statement).

Omit page 1, line 17, to page 4, line 9 and insert: "It was stipulated and admitted in evidence that corporation plaintiff was a corporation organized under the laws of the state of West Virginia; that copies of United States patents may be introduced without certificates; that file wrapper of patent in suit, duly certified, be admitted in evidence, marked: 'Plaintiff' Exhibit No. 1.' "

Omit page 42, line 24, to page 45, line 3.

Omit page 65, line 6 to page 66, line 3.

Omit page 68, line 6, to page 68, line 15, and insert: "Patent No. 691, 708 to Mallette, and No. 683506 to Mallette and Seyboldt, offered and admitted as defendants' Exhibits M-12 and M-13.

Plaintiff's Exhibit 6. File wrapper of patent in suit.

Plaintiff's Exhibit 7. Letters.

Plaintiff's Exhibit 8. Statement of yardage.

Plaintiff's Exhibit 9. Photograph.

Plaintiff's Exhibit 20. Photograph.

Plaintiff's Exhibit 21. Photograph.

Plaintiff's Exhibit 22. Small photograph.

Plaintiff's Exhibit 23. Picture.

Plaintiff's Exhibit 24. Picture.

Plaintiff's Exhibit 25. Photograph.

Plaintiff's Exhibit 26. Photograph.

Plaintiff's Exhibit 36. Picture.

Plaintiff's Exhibit 37. Photograph.

Plaintiff's Exhibit 38. Photograph.

Plaintiff's Exhibit 39. Photograph.

Plaintiff's Exhibit 40. Photograph.

Plaintiff's Exhibit 41. Photograph.

Defendant's Exhibit M-1. Cranford patent 88,139.

Defendants' Exhibit M-2. DeSmedt patent 375,273.

Defendants' Exhibit M-3. Barber patent 391,222.

Defendants' Exhibit M-4. Warren patent 727,506.

Defendants' Exhibit M-5. Boulton patent 17,483.

Defendants' Exhibit M-6. Warren patent 675,430.

Defendants' Exhibit M-7. Wilson patent 748,248.

Defendants' Exhibit M-8. Schutte patent 768,699.

Defendants' Exhibit M-9. Amies patent 932,941.

Defendants' Exhibit M-10. Wallace patent 1,183,057.

Defendants' Exhibit M-12. Mallette patent 691,708.

Defendants' Exhibit M-13. Mallette, et al, patent 683,506.

The opinion of the Court rendered on or about May 29, 1922.

Final Decree entered June 1, 1922.

Memorandum opinion of the Court dated July 5, 1922, and order thereon entered July 5, 1922.

Petition for Appeal, and Order allowing same.

Assignment of Errors.

Appeal Bond.

Citation on appeal, and ~~this~~ stipulations as to Transcript of Record on Appeal and Exhibits.

I DO FURTHER CERTIFY that the fees of the Clerk for comparing, correcting and certifying the foregoing Record on Appeal amount to and that said amount has been paid me by the Appellant herein.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the Seal of the District Court of the United States of America, in and for the Southern District of California, Southern Division, this day of May, in the year of our Lord One Thousand Nine Hundred and Twenty-three, and of our Independence the One Hundred and Forty-seventh.

CHAS. N. WILLIAMS,
Clerk of the District Court of the
United States of America, in and
for the Southern District of California.

By

Deputy.